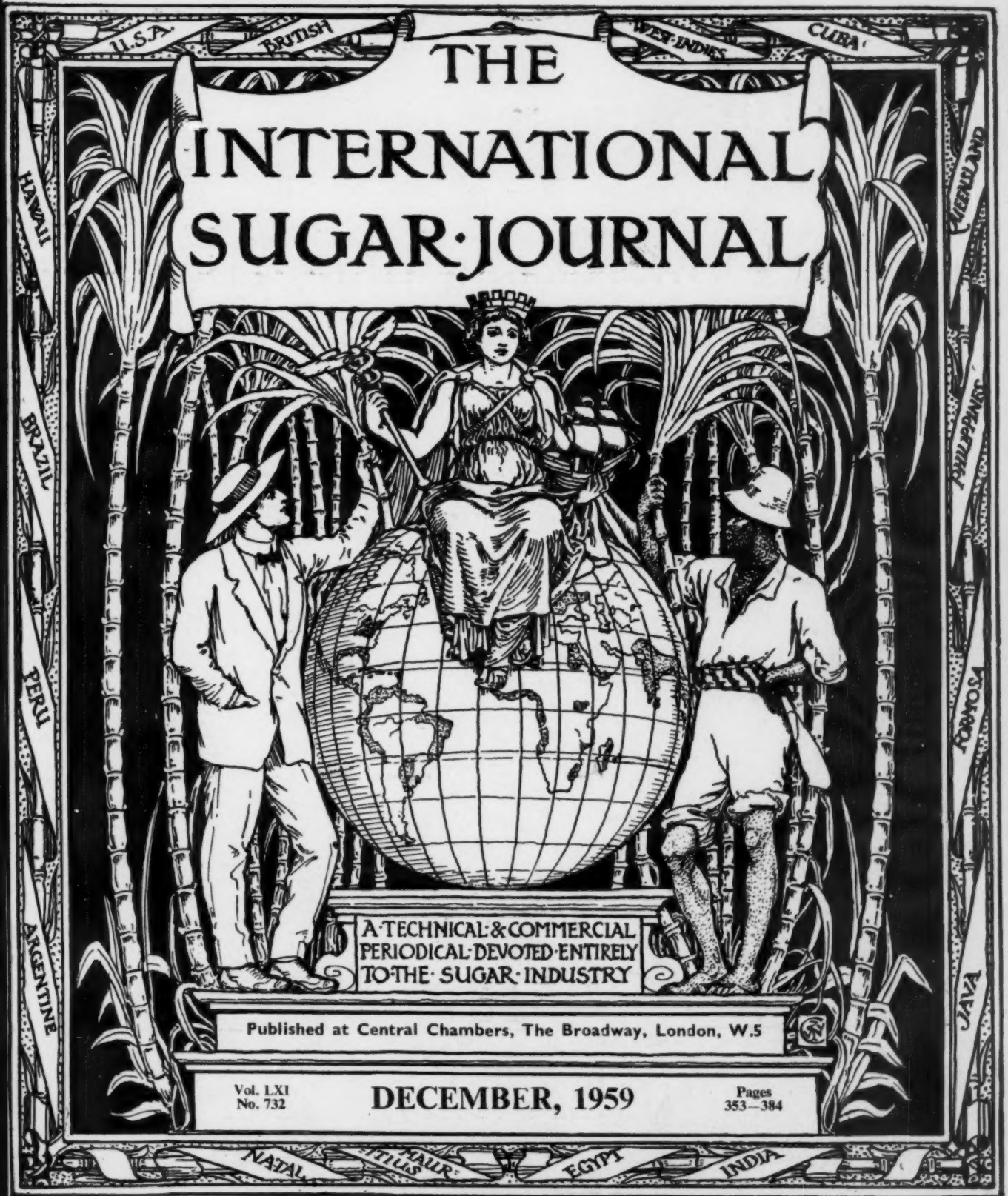
This Number contains the Index for 1959

2s 6d or 45 cents net
Annual Subscription £1 12s or $5·00 Post Free



THE INTERNATIONAL SUGAR·JOURNAL

A·TECHNICAL·&·COMMERCIAL PERIODICAL·DEVOTED·ENTIRELY TO·THE·SUGAR·INDUSTRY

Published at Central Chambers, The Broadway, London, W.5

Vol. LXI
No. 732

DECEMBER, 1959

Pages
353—384

For LIST OF ADVERTISERS see page lvi

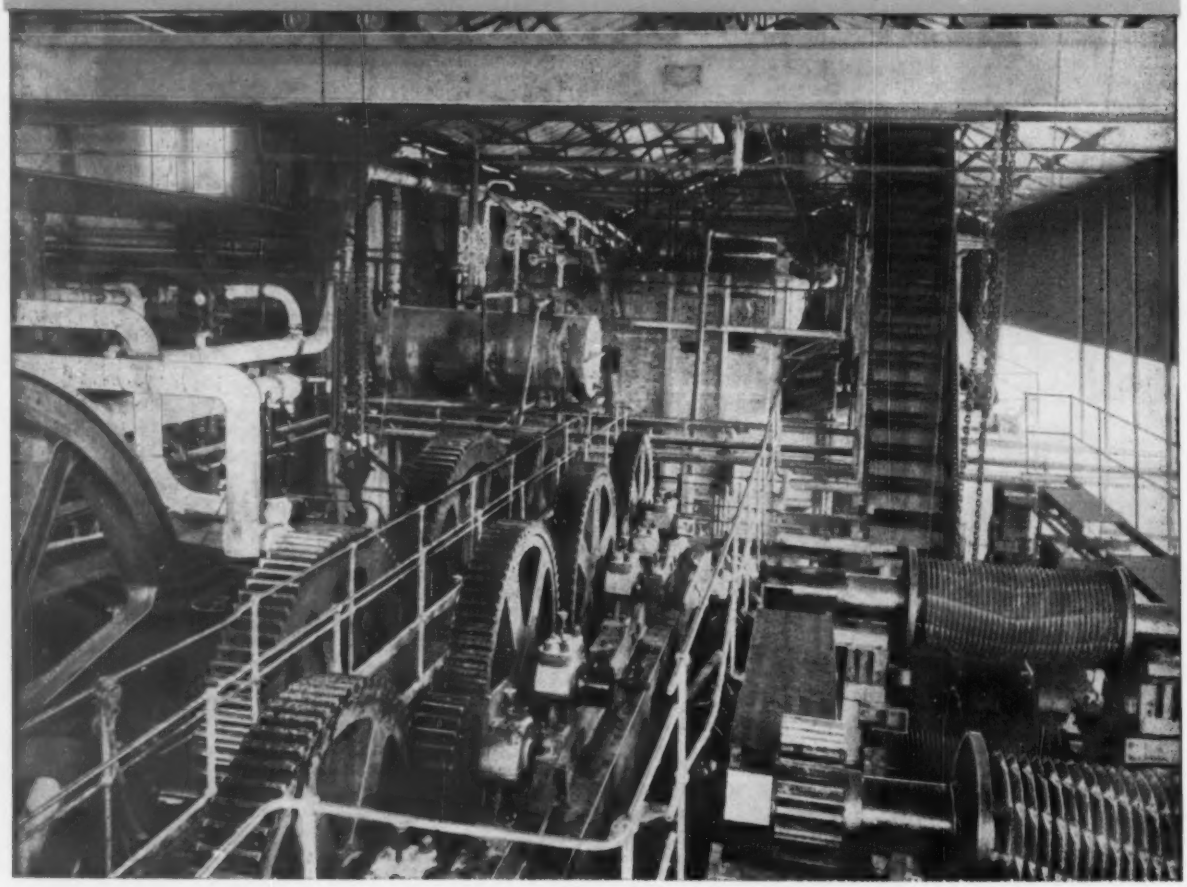
BLAIRS

COMPLETE

SUGAR

FACTORIES & REFINERIES

DISTILLERIES, ABSOLUTE ALCOHOL & CHEMICAL PLANTS



A photograph showing part of a Mill House of a Factory in Jamaica. It will be noted it was taken during off-season inspection.

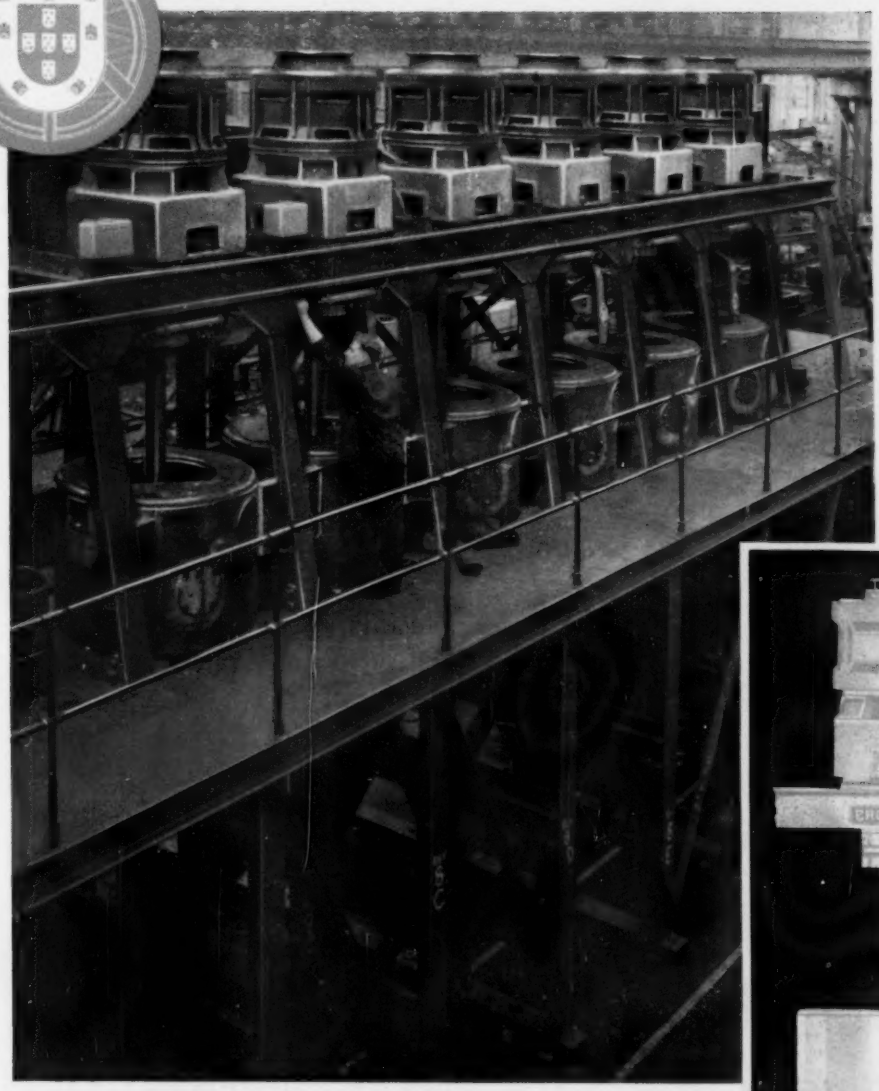
BLAIRS LIMITED

WOODVILLE STREET, GLASGOW, S.W.1

Cables : "BLAZON, GLASGOW"

London Office : **38 Grosvenor Gardens, S.W.1**

Cables : "Multivap, Sowest, London"



THE BROADBENT CENTRIFUGAL IS POWERED BY A SPECIAL BROADBENT MOTOR DESIGNED TO COMBINE MAXIMUM EFFICIENCY WITH EXCEPTIONAL RELIABILITY!

FOR MOZAMBIQUE

A battery of six 42" x 24" centrifugals with 600/1200/1800 R.P.M. synchronous motors photographed during assembly and testing in our works prior to despatch to the LUABO factory of Sena Estates Ltd.

The machines are to be installed to cure C massecuites.

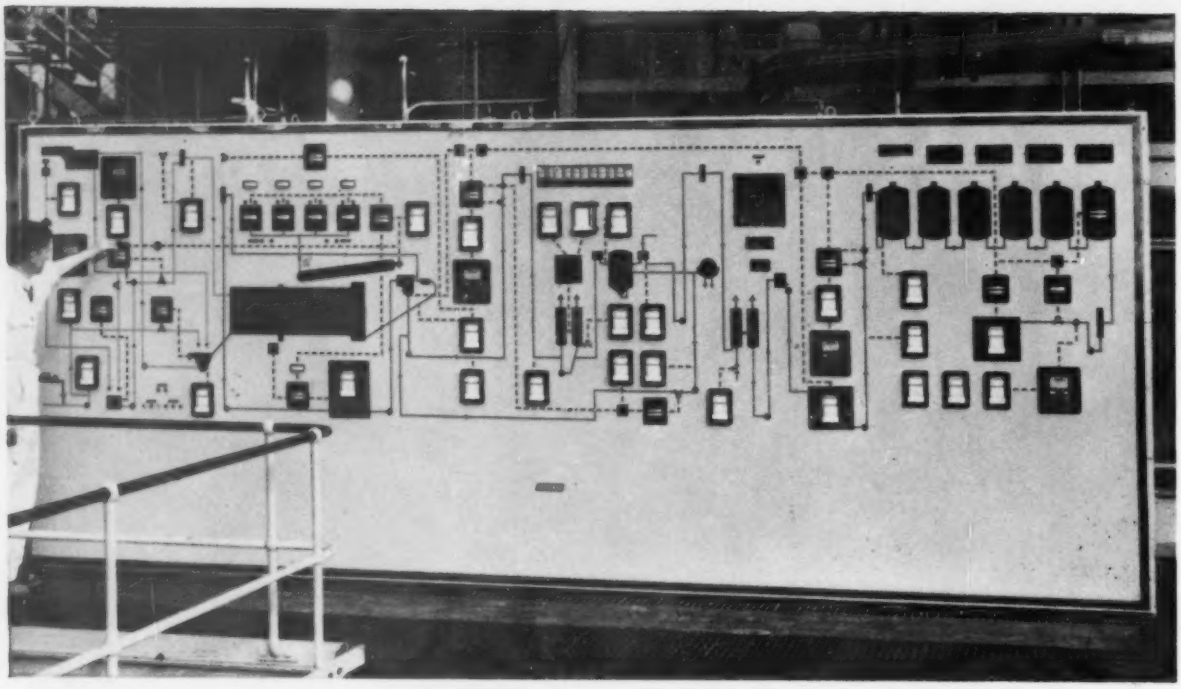
BROADBENT

THOMAS BROADBENT & SONS LTD · CENTRAL IRONWORKS · HUDDERSFIELD · ENGLAND

The world's largest manufacturer concentrating entirely on industrial centrifugals

Telephone 5520-5 *Telegrams: BROADBENT HUDDERSFIELD*

BI/9



EVERSHED

Electronic Control for British Sugar Sets a world example

RESULTING IN ORDERS FOR SIMILAR EQUIPMENT FROM BELGIUM, RUSSIA, WEST INDIES

EVERSHED EQUIPMENT MEASURES AND AUTOMATICALLY CONTROLS:

Flow – Density – Brix – Level – Speed – Weight – pH – Conductivity

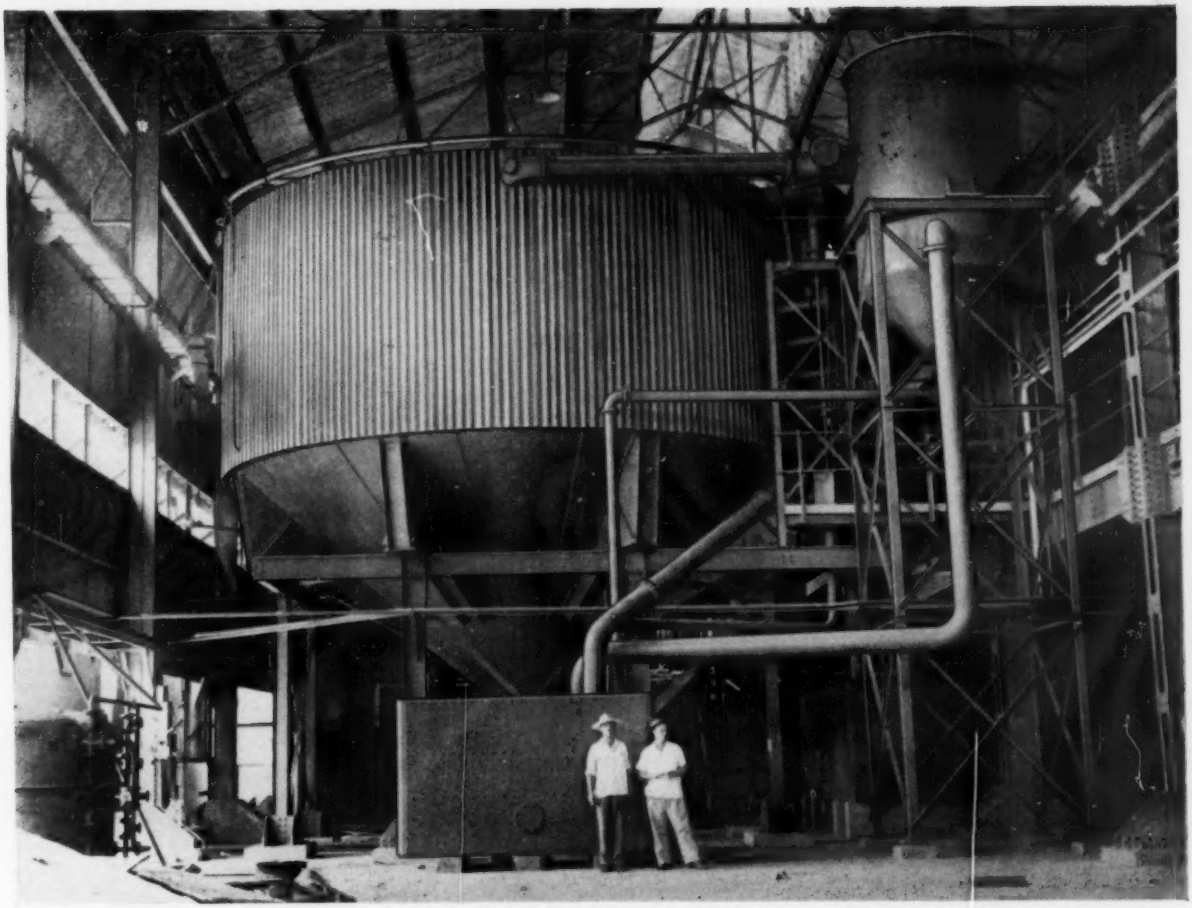
EVERSHED SERVES INDUSTRY

EVERSHED & VIGNOLES LIMITED · CHISWICK · LONDON W.4

EVERSHED & VIGNOLES (CANADA) LIMITED · TORONTO · CANADA

EVERSHED ENRAF · DELFT · HOLLAND

7/127A



'Mirrlees'

BACH CONTINUOUS SUBSIDERS

Illustrated is one of our most recent installations, a 30 feet, 5 tray Subsider in operation in Venezuela.

This Subsider enables juice to be drawn off at 5 points of optimum clarity. Surface evaporation is obviated, no surface scum enters the tank, and a high temperature is maintained throughout the apparatus.

SEALED 'Mirrlees' 'Bach' CLARIFICATION

The MIRRLEES WATSON COMPANY LIMITED

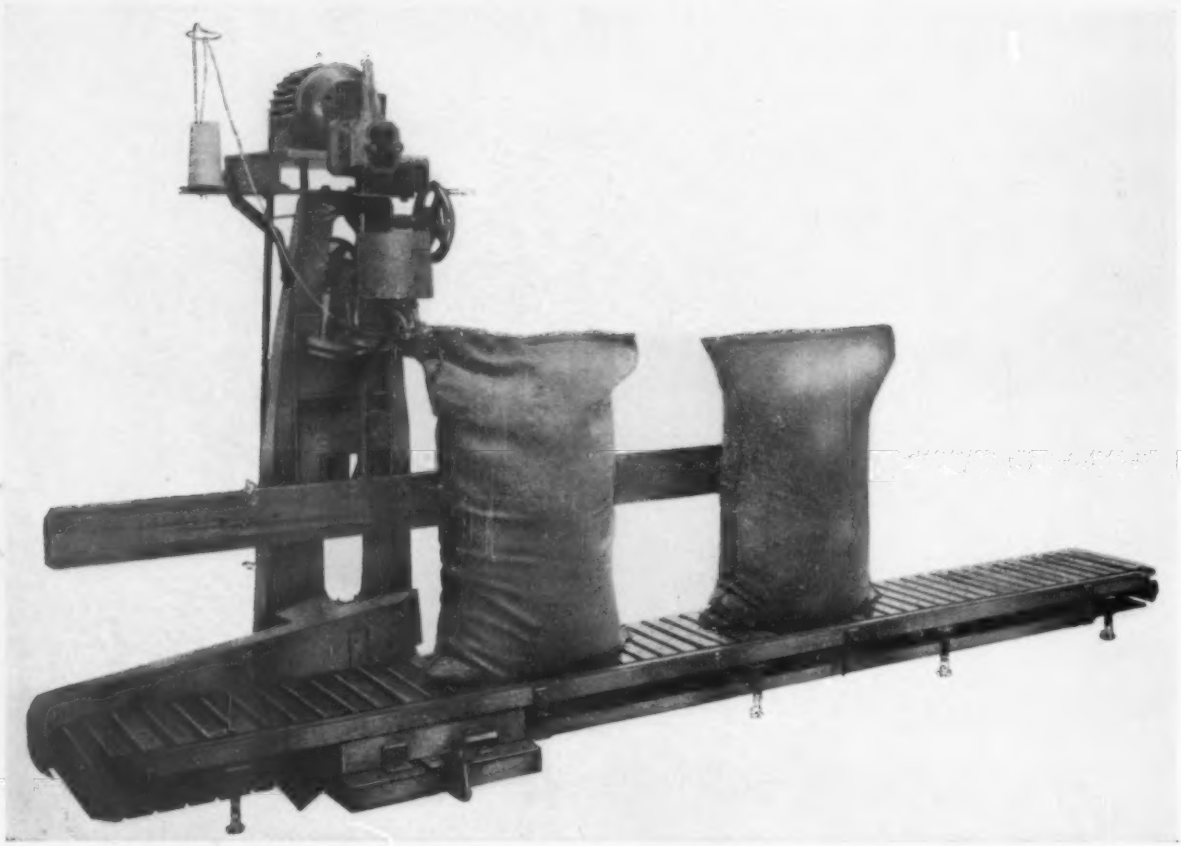
SCOTLAND STREET GLASGOW, C.5

London Office: 38 GROSVENOR GARDENS, S.W.1

The 'Super' Universal Sack Closing Machine

MODEL NO. 5B

Fitted with 10 or 12 ft. Conveyor and Special Clutch Drive



This machine is fitted with a conveyor 10 or 12 ft. overall and a Special Clutch Drive which allows the conveyor to be run independently of the sewing head.

Jute, Hessian, Paper Lined Hessian, Cotton and Paper Sacks weighing from 50 to 325 lbs. can be sewn on this machine.

Machines can be seen working by appointment.

Power required 2 h.p. *Shipping weight : 14 cwts.*

Manufactured in Great Britain by :

The Sack Filling & Sewing Machine Syndicate Limited

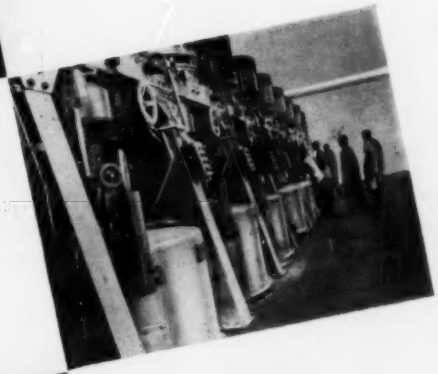
(Timewell's Patent)

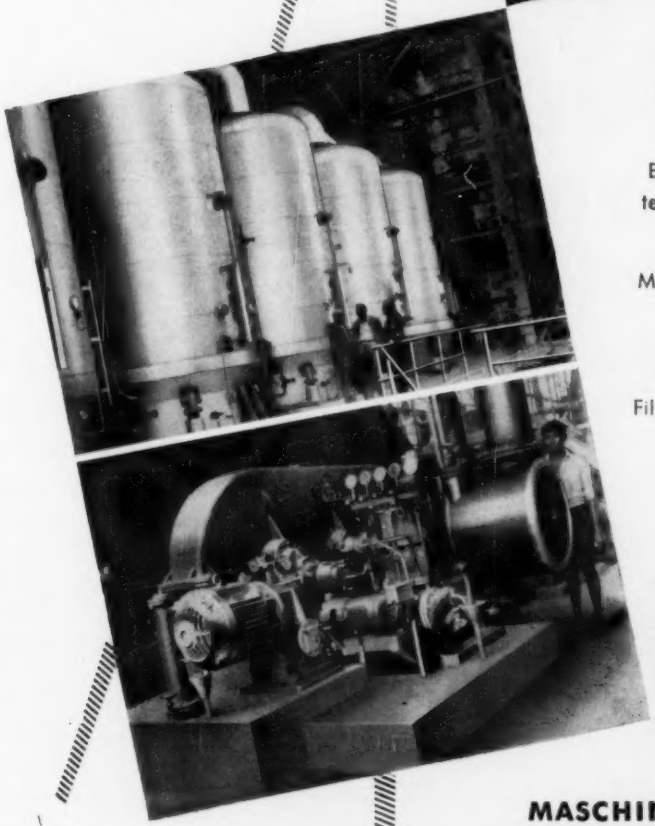
TIMEWELL WORKS · LOCKFIELD AVENUE · BRIMSDOWN · ENFIELD . MIDDX.

Telephone : HOWARD 1188 *Telegrams :* FECIT, ENFIELD

COMPLETE SUGAR FACTORIES

INCLUDING
CUBE SUGAR AND LOAF SUGAR PLANTS





for the production of cane sugar up to highest grade refined sugar.

Basing on modern development in sugar technology we modernize plants of older design to obtain the highest economy.

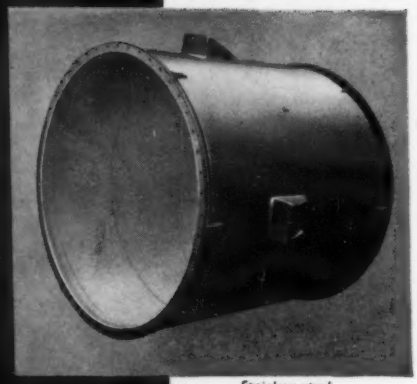
Mill plants with single and group drive · Especially reconstruction of outdated mills · Centrifugal machines for white sugar, refined sugar, raw sugar. Filter plants suitable to solve all problems of filtration · Drying plants for the sugar industry · Power stations for all pressures and capacities.

Delivery of single machines and apparatus · Planning and erection of complete cane and beet sugar factories.

MASCHINENFABRIK BUCKAU R. WOLF
AKTIENGESELLSCHAFT · GREVENBROICH-NEUSS
(WESTERN GERMANY)

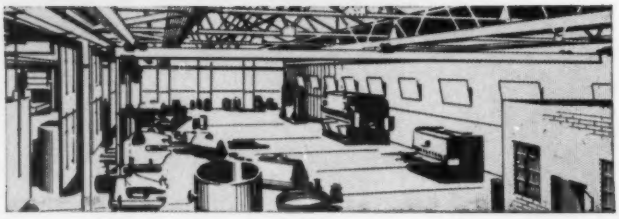
9068 a

1,000 gall. kettle in ¼" copper. Lynx Quasi-arc welded.



Stainless steel vessel with mild steel jacket

12,000 gallon water separator



WELDED FABRICATIONS

ORDINARY OR EXTRAORDINARY

CLARKS CAN COPE

STAINLESS STEEL, MILD STEEL, ALUMINIUM FABRICATIONS COMPLETE WITH VALVEWORK AND PIPEWORK

METALLIC ARC WELDING

ARGONAUT AND ARGON-ARC WELDING

STRESS-RELIEVING AND TESTING FACILITIES

Clark's modern methods, efficient equipment, unique facilities and practical approach all operate to your advantage....

Clarks offer you a unique combination of the most advanced equipment and methods with a century-old reputation for high craftsman standards on every type of fabrication work.

Stainless steel, mild steel, aluminium, copper or aluminium-bronze . . . Clarks of Hull will not only give you the practical solution to your problem—they'll deliver a first-class job on time !

Send that enquiry *first* to Clarks of Hull.

CLARK

GEORGE CLARK & SONS (HULL) LIMITED
HAWTHORN AVENUE, HULL

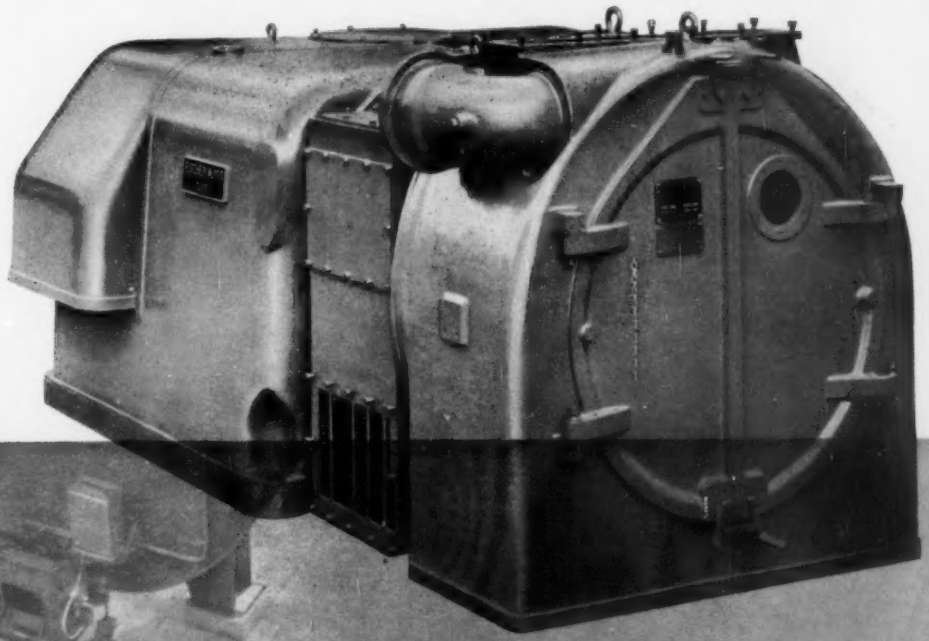
Telephone 37654 Telegrams 'Clark Hull'

A MEMBER OF THE NEWMAN HENDER GROUP

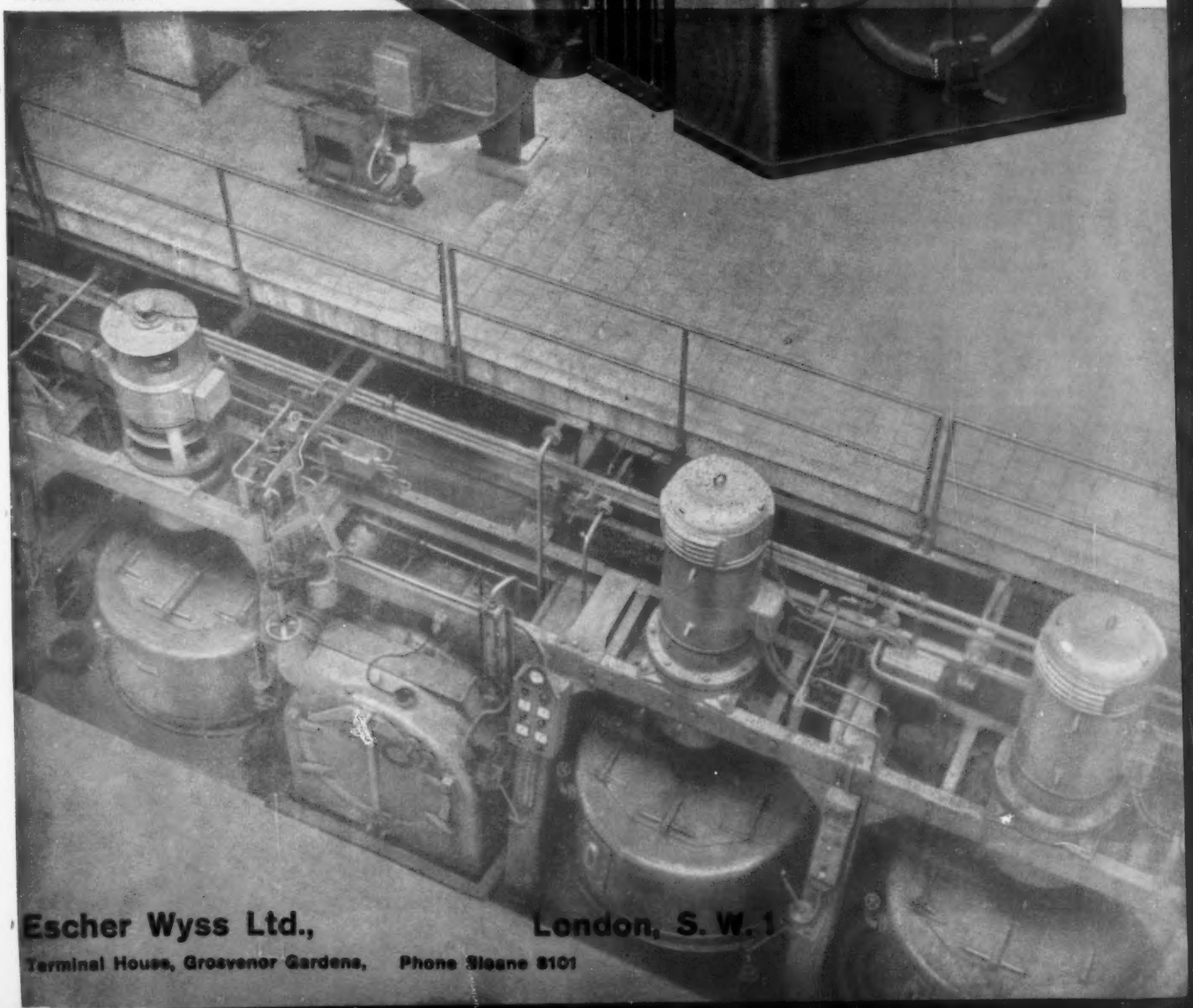
ESCHER WYSS

continuous centrifuges for the sugar industry

These centrifuges are in operation at Sugar Factories throughout the world.



Escher Wyss Centrifuge as replacement in a battery of vertical machines.



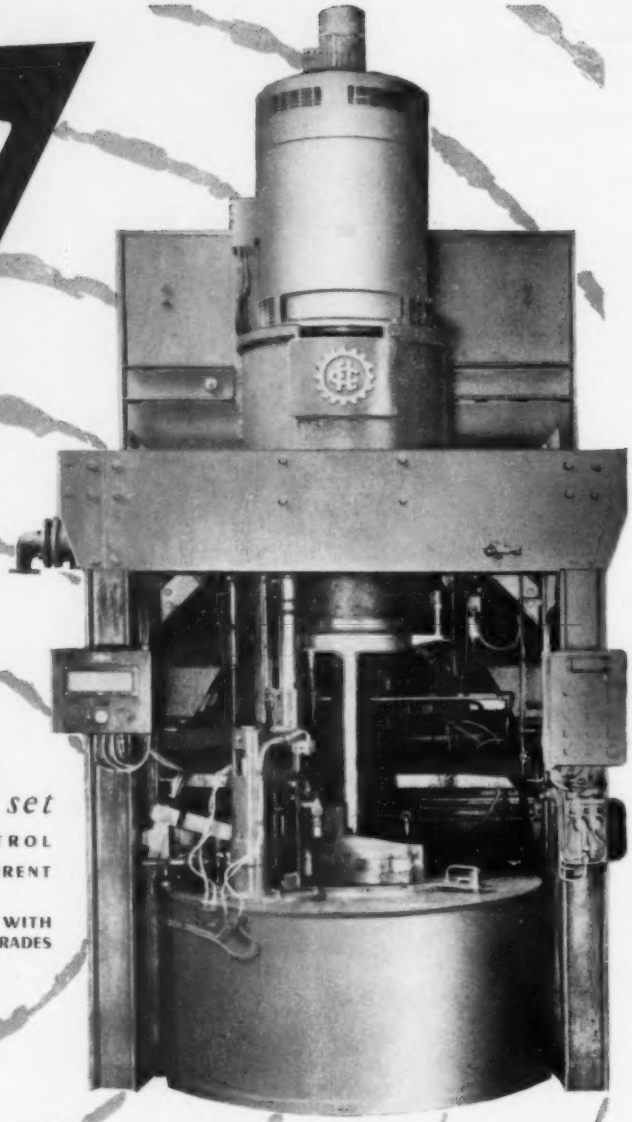
Escher Wyss Ltd., **London, S. W. 1**

Terminal House, Grosvenor Gardens, Phone Sloane 8101

Fully automatic!

the new

CENTRIFUGAL



driven by
WARD-LEONARD *set*

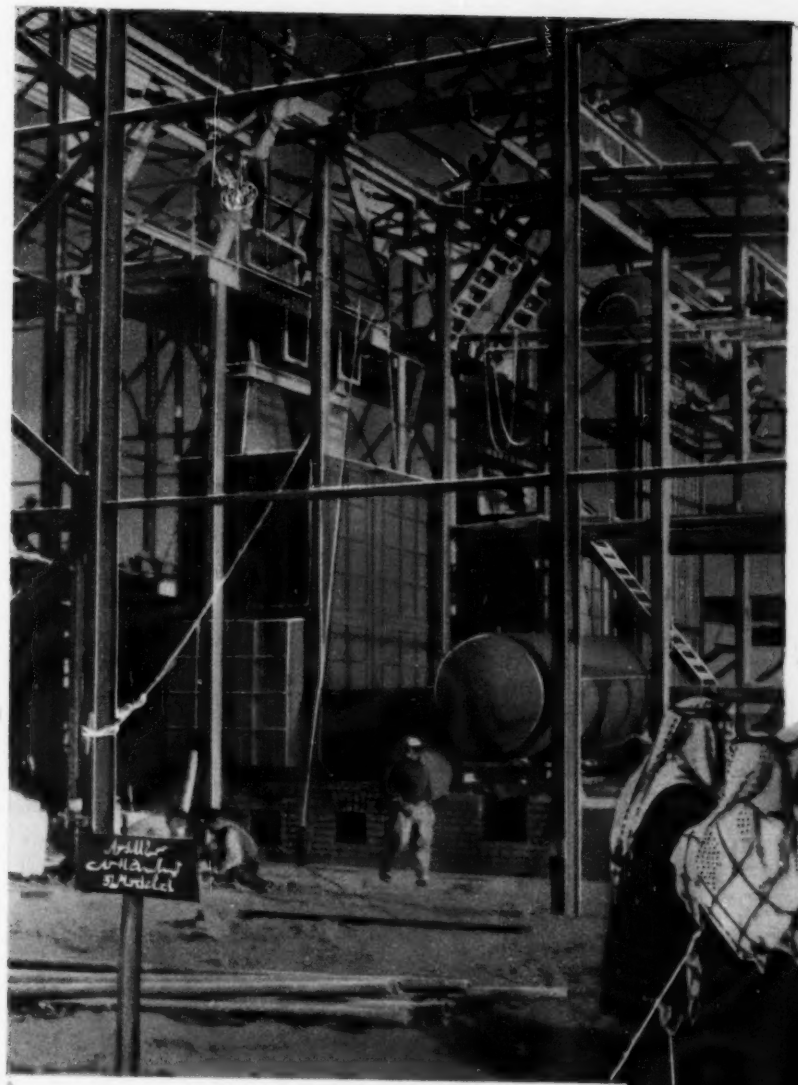
- ELECTRONIC CONTROL
- ELIMINATION OF CURRENT PEAKS
- RECORD PRODUCTION WITH MASSECUITES OF ALL GRADES

Battery of 4 centrifugals at the Fontaine-le-Dun Sugar Factory (France)

S.A.G. - PARIS

FIVES LILLE - CAIL

7, rue Montalivet, PARIS (8e) - Tél.: ANJou 22-01 et 32-40

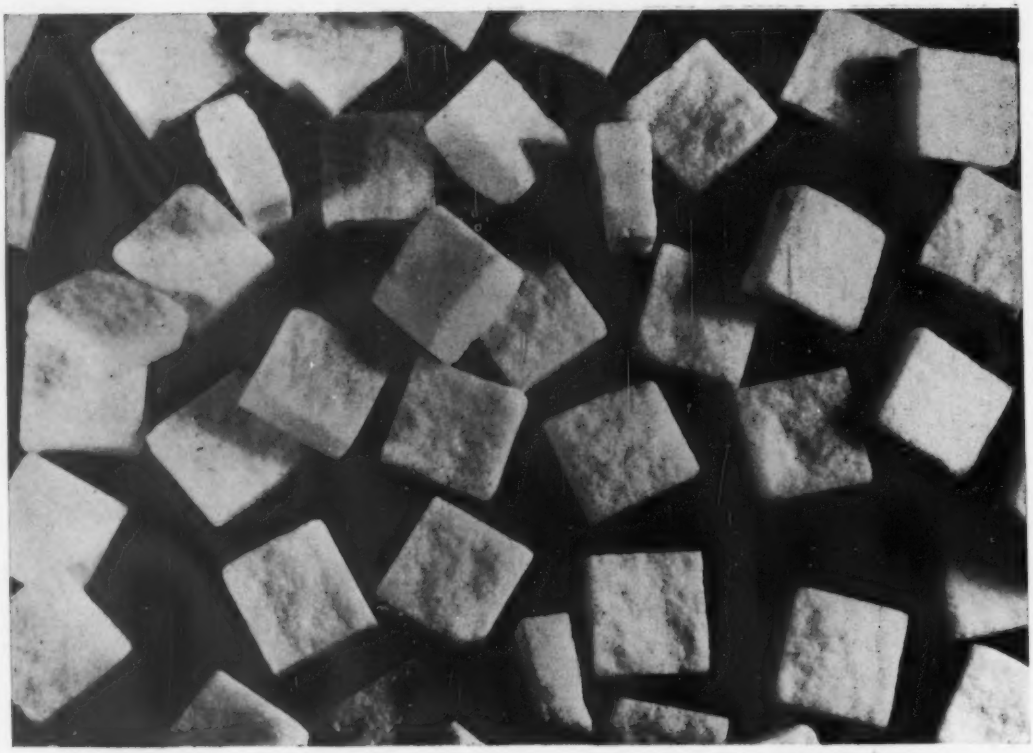


A little chat about factory routine among Arab foremen, whilst the erection of the Salzgitter sugar factory forges ahead on the sunny banks of the lazy River Tigris

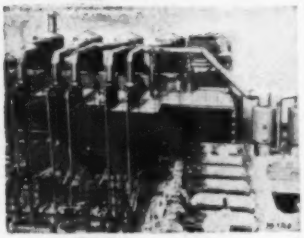
SALZGITTER INDUSTRIEBAU GMBH

Consulting Engineers and General Contractors

SALZGITTER-DRÜTTE GERMANY



COMPLETE MACHINERY AND EQUIPMENT FOR BEET OR CANE PROCESSING



We can also deliver equipment for alcohol production

TECHNOEXPORT

Foreign Trade Corporation for Export of Complete Industrial Plants

More than 500 Sugar Mills supplied in various countries

Prague II, Vaclavske nam. 56, Czechoslovakia

More than 500

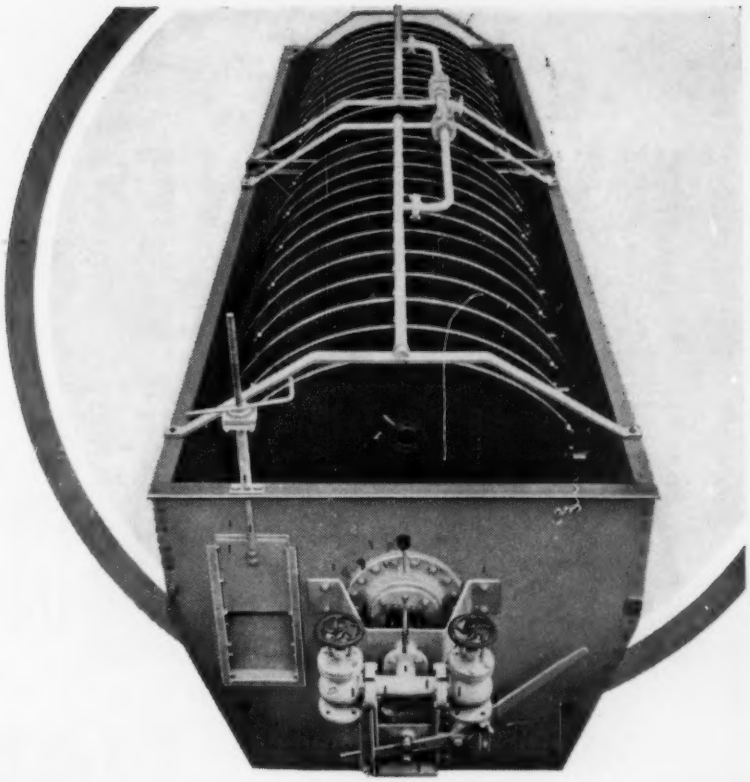
WERKSPOOR

Rapid

Crystallizers

in use in

sugar factories



Applications for high grade as well as for LOW GRADE massecuites!

Licensees for the manufacturing of Werkspoor Rapid Crystallizers:

Ansaldo - San Giorgio
Genoa - Italy

Atlantic, Gulf and Pacific Company of Manila, Inc.
Manila - Philippines

Maschinenfabrik Buckau R. Wolf A.G.
Grevenbroich - Germany

Fives Lille - Cail S.A.
Paris - France

Honolulu Iron Works Co. Inc.
Honolulu - Hawaiian Islands

Honolulu Iron Works Co. Inc.
New York - U.S.A.

A. & W. Smith & Co. Ltd.
London - Great Britain

Succesores de Abarca Inc.
San Juan - Puerto Rico

WERKSPOOR

AMSTERDAM WORKS (Holland)

Baudoin

RANSOMES IMPLEMENTS

ON ACTIVE SERVICE ALL OVER THE WORLD

C.68 CULTIVATOR
A heavy-duty mounted toolbar, available with cultivating tines, ridging bodies, and disc ridging or disc bedding attachments.

C.68 DISC RIDGER
Supplied with two or three sets of discs for ridges of varying widths.

C.75 MOUNTED SUBSOILER
Works to a depth of 22 ins. and can be converted to mole drainer, ridger or trencher.

C.59 SUBSOILER
Will break subsoil up to 26 in. deep in most strenuous conditions. In place of the single standard, two for working 18 in. deep can be fitted, or three which will give good results up to 14 in. deep.

Ransomes

DISTRIBUTORS IN MOST COUNTRIES

Send for fully descriptive literature

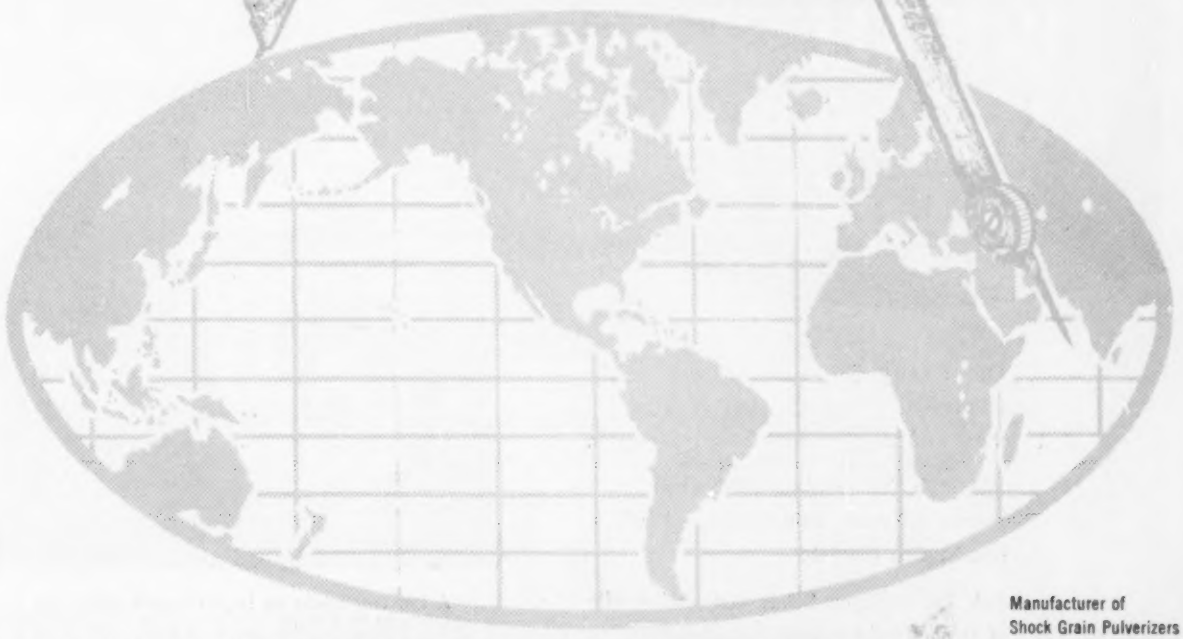
FAMOUS THROUGHOUT THE WORLD FOR AGRICULTURAL MACHINERY

RANSOMES SIMS & JEFFERIES LTD. · IPSWICH · ENGLAND

GRUENDLER CANE SHREDDING PROCESS IS NOW A PROVEN AND ACCEPTED PRACTICE THROUGHOUT THE WORLD

SPANNING THE SUGAR WORLD WITH AN ASSURANCE OF

- INCREASED SUCROSE EXTRACTION
- INCREASED CAPACITY
- LONGER ROLL LIFE
- BETTER BAGASSE



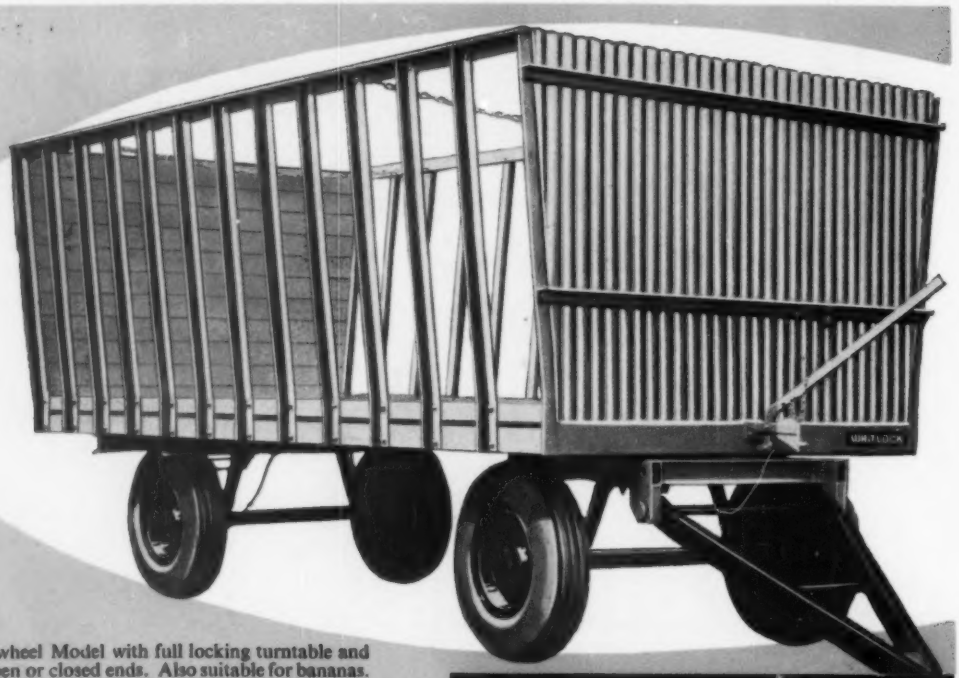
GRUENDLER CRUSHER & PULVERIZER CO.

Established 1885

2915 North Market
St. Louis 6, Mo., U.S.A.

Leo Freeman, V. P. Sugar Mill Div.
2530 Terrace Ave., Baton Rouge, La., U.S.A.

Manufacturer of
Shock Grain Pulverizers
Cane Trash Shredders
Bagasse Cleaner
and Filter Aid
Bale Breakers
Elevating and
Conveying Equipment

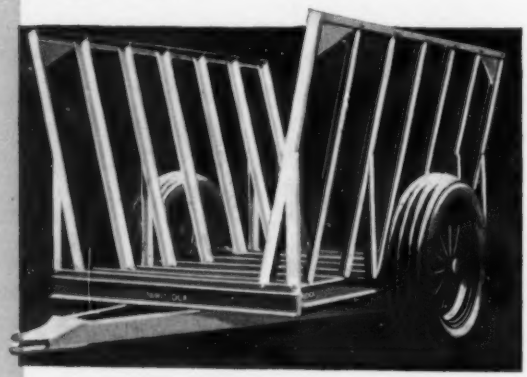


4-wheel Model with full locking turntable and open or closed ends. Also suitable for bananas. In various carrying capacities.

Cut cartage costs with

WHITLOCK CANE & FRUIT TRAILERS

4-wheel Goose-Neck type of pressed steel construction with extra heavy bracing for loads up to 6 tons.



A low cost model on large diameter wheels for loads up to 5 tons.

Our factory representatives are at the moment travelling the cane growing areas and may be visiting you personally.

Whitlock Cane Trailers are backed by many years experience and will stand-up to the job.

Ask for catalogue SC.41 and send details of your requirements.

WHITLOCK BROS LTD. GREAT YELDHAM ESSEX ENGLAND Tel: Great Yeldham 305 (8 lines)

YORKSHIRE IMPERIAL

place at your disposal
their long, specialised experience
in the metallurgical development
and manufacture of

TUBES FOR THE SUGAR INDUSTRY

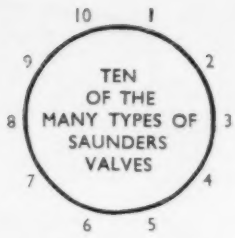
The resources of Yorkshire Imperial Metals Limited are devoted solely to the manufacture of non-ferrous tubes, plates and fittings, and plastic tubes and fittings. They have long been intimately associated with the Sugar Industry, both at home and overseas, and have made a careful study of the varied and often arduous operating conditions which obtain in the Industry. This study has resulted in the development of improved tube and plate alloys, metallurgically designed and scientifically manufactured to give the best possible service. This unrivalled experience is at your service, free of charge and without obligation, to assist in the solution of problems of all kinds affecting the life and use of non-ferrous tubes and plates.

Yorkshire Imperial craftsmanship, metallurgical skill and specialised experience, together with modern plant and methods and accurate control at every stage of manufacture, account for the enviable reputation which *Yorkshire Imperial* tubes and plates and *Yorkshire Imperial* fittings have achieved in their respective fields.

TUBES IN "YORCORON/KUNIFER 30A" · "YORCUNIC/KUNIFER 10" COPPER AND "SEVA" BRASS · PLATES IN A WIDE RANGE OF ALLOYS · BI-METAL TUBES AND PLATES.

YORKSHIRE IMPERIAL METALS LIMITED

HEAD OFFICE—P.O. BOX 166, LEEDS.
TELEPHONE: LEEDS 7-2222



1 Piston Operated
½"—14"

2 Diaphragm Operated
Pressure Opening
½"—6"

3 Lever Operated
90° Quick Action
½"—1¼"

4 Handwheel Operated
¼"—14"

5 Extended Spindle
½"—14"

6 Plastics Valves
½"—2"

7 Electrically Operated
½"—14"

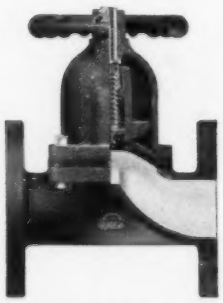
8 Chainwheel Operated
1½"—14"

9 Diaphragm Operated
Pressure Closing
½"—8"

10 Lever Operated
Quick Action with
Positional Lock
1½"—4"

SAUNDERS DIAPHRAGM VALVES

Millions in use around the world for handling fluids as simple as air and water, as delicate as food and medicines, as difficult as corrosives and abrasives

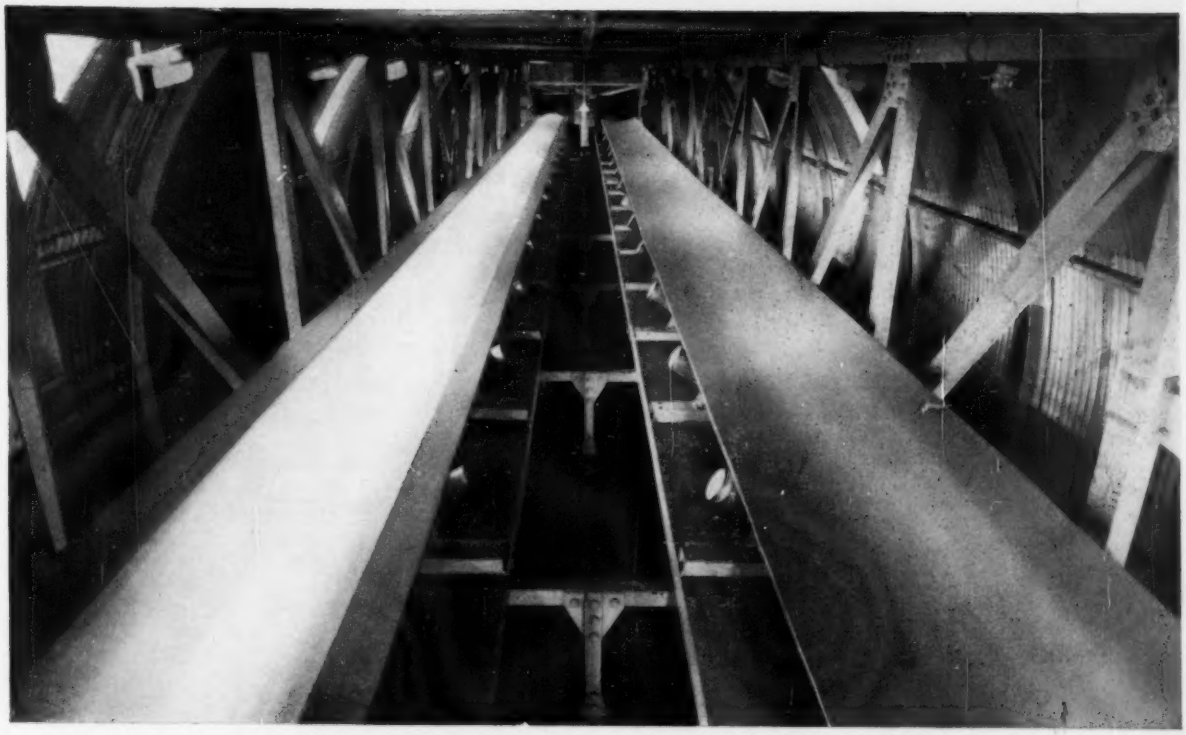


Showing isolated mechanism, flexible diaphragm, streamline flow, robust, glandless construction.

SAUNDERS VALVE COMPANY LIMITED

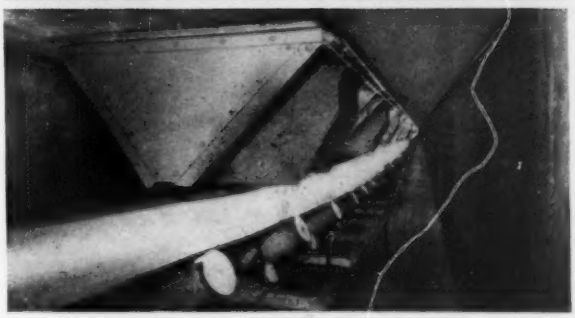
DIAPHRAGM VALVE DIVISION

CWMBRAN · MONMOUTHSHIRE · ENGLAND



SPENCER HANDLING PLANT SPEEDS THE FLOW OF SUGAR

The inclined gantry above and right, is equipped with two 42 in. Spencer troughed belt conveyors. One travelling at 400 ft. per minute handles 600 tons of sugar per hour and the other at 240 ft. per minute has an hourly capacity of 350 tons. Sugar is weighed by automatic weighers in the tower before being taken by other conveyors either to the vehicle loading tower seen in the background or into the 100,000 ton silo by two Spencer shuttle conveyors operating in the roof. Sugar is reclaimed from the silo by the 42 in. wide conveyor shown bottom right, which operates beneath the silo floor where it is fed by 42 hoppers and 4 travelling feeders.



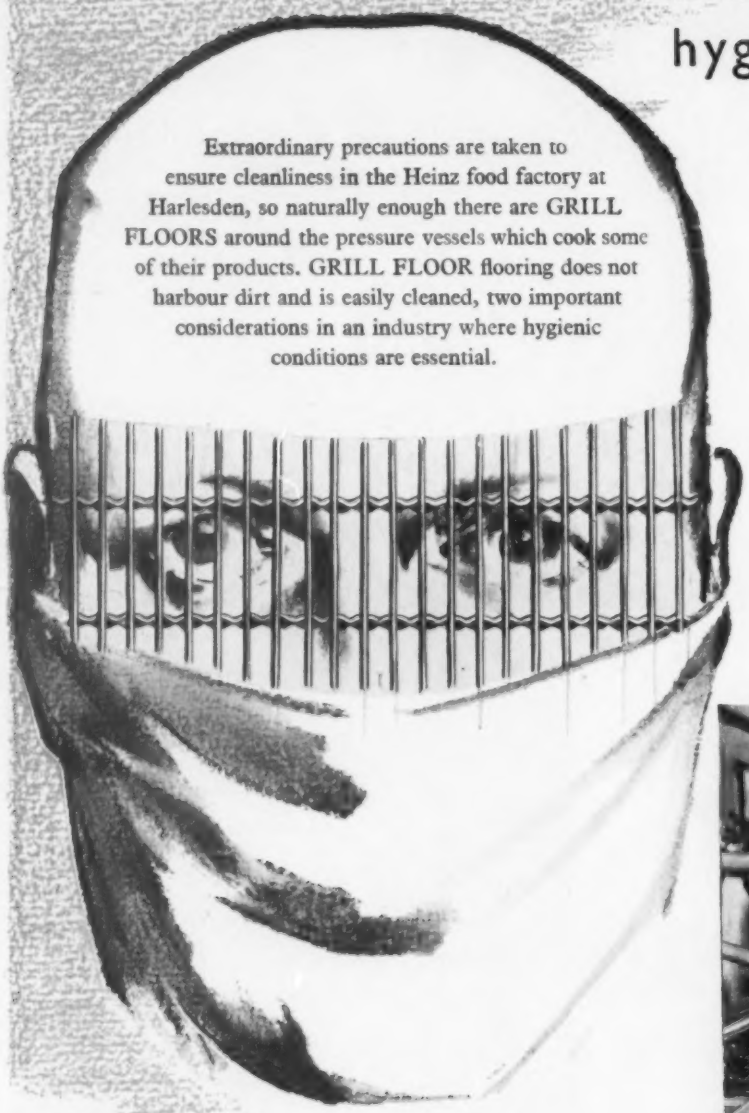
(Pictures by kind permission of Messrs. Tate & Lyle.)

SPENCER

HANDLING PLANT

SPENCER (MELKSHAM) LIMITED · MELKSHAM · WILTSHIRE

Branch Offices:
Ingersoll House, 9 Kingsway, London, W.C.2. *Tel:* Covent Garden 1800. 34 Castle Street, Liverpool 2. *Tel:* Liverpool Central 3738.
34 Great North Road, Newcastle-upon-Tyne. *Tel:* Newcastle 26800.

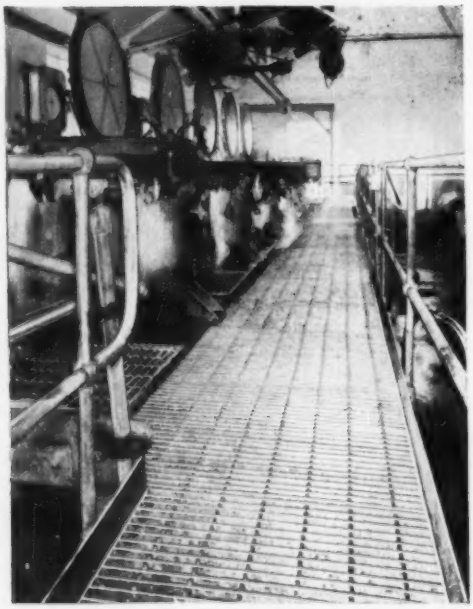


Extraordinary precautions are taken to ensure cleanliness in the Heinz food factory at Harlesden, so naturally enough there are GRILL FLOORS around the pressure vessels which cook some of their products. GRILL FLOOR flooring does not harbour dirt and is easily cleaned, two important considerations in an industry where hygienic conditions are essential.

hygiene at

HEINZ

CEMENT WORKS
MATERIALS HANDLING PLANT
AIRCRAFT INDUSTRY
COAL WASHERIES
POWER STATIONS
OIL REFINERIES
GAS WORKS
CHEMICAL PLANTS
WATER WORKS
FOOD PREPARATION PLANTS
ETC., ETC.



GRILL FLOOR flooring surrounding pressure vessels at Heinz, Harlesden factory, London.

GRILL walkways

GRILL FLOORS LTD LONDON W.10

TELEPHONE: LADBROKE 3066-7 (2 LINES) *TELEGRAMS: ETYLADEC WESPHONE LONDON*

P789

Fully continuous flow centrifugals of Hein, Lehmann & Co. A.G. are excellently suitable for curing of most difficult massecuites, e.g. C-, final or second product.

Latest modifications in construction allow them to be used also in affining stations.

Hein, Lehmann & Co. centrifugals are already working in various countries and have stood the test everywhere.

Patents have been taken out for the fully continuous flow centrifugal in Germany and other countries.

Fully Continuous Flow Centrifugals

offer the following advantages:

- continuous working
- reduction of working personnel
- small current consumption, no current peaks
- high output
- light weight
- no special foundations
- vibration-free running
- uniform sugar quality

HEIN, LEHMANN & CO.

Aktiengesellschaft Dusseldorf

Abt. Massentrennung

Telephone: 70201 *Telex:* 0858 2740 P.O. Box 9107

NEW PROJECT? *Consult FIRST*

THE DUNFORD & ELLIOTT

ENGINEERING GROUP

for higher efficiency, lower costs, improved product

The wide range of activities of the Dunford & Elliott Group has been built upon the application of technical know how in closest collaboration with the customer at every stage of the required project.

This ensures from the outset that the installation progresses exactly according to the customer's needs thus saving time, trouble and money.

And that's why more and more progressive firms throughout the country are coming to Dunford & Elliott with their efficiency problems—many of them the biggest names in Industry.

DUNFORD & ELLIOTT

Process Engineering Ltd.

Range of Plant & Equipment :

ROTARY LOUVRE CONTINUOUS DIRECT DRYERS & COOLERS
ROTARY WATER LOUVRE CONTINUOUS INDIRECT COOLERS
SEMI-INDIRECT ROTARY LOUVRE CONTINUOUS DRYERS & COOLERS
PACKAGED DRYERS & COOLERS
SEMI CONTINUOUS FILTER PRESSES
ROTARY PELLETISERS
ROTARY LOUVRE NUT ROASTERS (CONTINUOUS)
CONTINUOUS COCOA BEAN ROASTERS & ALKALISERS
MATERIAL HANDLING PLANT
CONTINUOUS AIRTIGHT ROTARY VALVES.
DIRECT FIRED AIR HEATERS for oil, gas or solid fuels.

THERMIX INDUSTRIES LTD.

Range of Plant & Equipment :

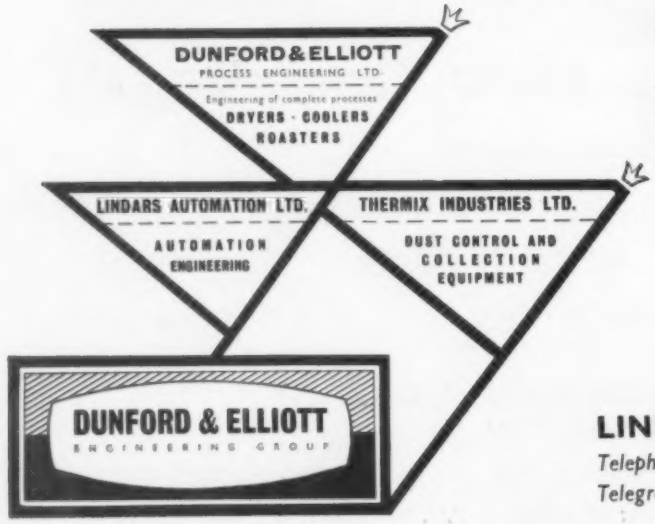
DUST COLLECTION.
6 in. & 9 in. diameter tubes both single and double inlet types.
High efficiency Cyclones.
Bag Filters both fully automatic and semi automatic.
Wet Washers both vertical venturi and water bath types.
CONSTANT RATE FEEDERS FOR FINE DUSTS rated from 20 lb. per hour upwards.
DUST SAMPLING EQUIPMENT
PNEUMATIC CONVEYING
DUST/AIR TIGHT SLIDE DOORS both single & double, hand operated.
CONTINUOUS DISCHARGE AIRTIGHT SLEEVE VALVES FOR granular and powdered material.
FLUIDISED CONSTANT DISCHARGE VALVES

LINDARS AUTOMATION LTD.

Range of Plant & Equipment :

PROCESS CONTROL EQUIPMENT, suquential or otherwise.
AUTOMATIC BATCH WEIGHING OF SOLIDS OR LIQUIDS with direct or remote weight setting.
DATA LOGGING & PROCESSING OF PLANT VARIABLES
CONSTANT WEIGHT FEEDERS & CONTROLS
AUTOMATIC WEIGHING & BLENDING SYSTEMS
REMOTE QUANTITY SETTING LIQUID BATCHING SYSTEMS
DIAL SCALE READ OUT SYSTEMS GIVING CARD, TAPE OR PRINTED OUTPUT.
TIMER COUNTER UNITS
ELECTRO/PNEUMATIC SLIDE DOORS with remote control for hoppers & bunkers.
BIN LEVEL DETECTORS.

TEST PLANT & DEMONSTRATION FACILITIES FREELY AVAILABLE



In recent years the facilities available to our friends and clients have been greatly increased to provide comprehensive facilities for test and demonstration, and also to ensure that the final product is the very best possible for the specific problem.

LINFORD STREET, LONDON, S.W.8

Telephone: MACauley 2405/6.

Telegrams: Lindaresco, Telex, London.

To meet a long felt need in the field of polarimetry, Ericsson Instrument Division has now produced an electronically controlled, self balancing, photo-electric polarimeter.

Based on a design by the National Physical Laboratory this instrument has been developed to eliminate much of the tedium of present visual methods by *automatically* measuring the optical activity of solutions.

Recent installations employing the ETL-NPL Automatic Polarimeter have been made by the British Sugar Corporation in a number of their beet reception tarehouse, where the instruments have amply demonstrated their consistent accuracy.

Because of its extremely high sensitivity the automatic polarimeter is able to utilise a much shorter sample cell length. This feature will be of particular interest to those industries which handle light absorption solutions which until now could only be measured for optical activity with difficulty by visually balanced instruments.

Since the optical activity of the sample solution appears in electrical form, the result can be readily displayed on a pointer type meter, pen recorder, printer or in digital form. These can be calibrated in degrees of arc or to any other convenient scale. In addition output can be linked with servo systems for industrial control purposes.

Auxiliary equipment available includes analogue-digital converters and recording instruments for providing visual or permanent records.

This advance in polarimetry will prove particularly useful where a large number of readings are required to be taken continuously over long periods.

If you would like more detailed information on the ETL-NPL Automatic Polarimeter 143A please write to:—

People who count use Ericsson

ERICSSON

INSTRUMENT DIVISION,
HIGH CHURCH STREET,
NEW BASFORD, NOTTINGHAM.
TEL. NO. 75115

ERICSSON TELEPHONES LIMITED, HEAD OFFICE, 22 LINCOLNS INN FIELDS, LONDON, W.C.2
TELEPHONE NO. HOLBORN 6936

E117A-96A

Helping to sweeten it is our cup of tea

Tea needs sugar. Sugar needs refining. Refineries need gears. Big gears, heavy gears, reliable gears. That's where the Jackson Division of David Brown comes in.

What, in particular, can David Brown offer? First, the advantages in speed and reliability of having casting, machining and cutting carried out in the same organisation. Second, the capacity to produce heavy-duty gears—spur, helical or bevel—up to any size and weight for any industry and every bit as accurately as you need. Third, the finest advice on heavy gear design problems that you will find anywhere.

Behind every 'Jackson' gear there are over 100 years of sound technical experience. In front of every 'Jackson' gear there is a long, long life of hard, hard work. And the bigger your requirements, the better David Brown can handle them.

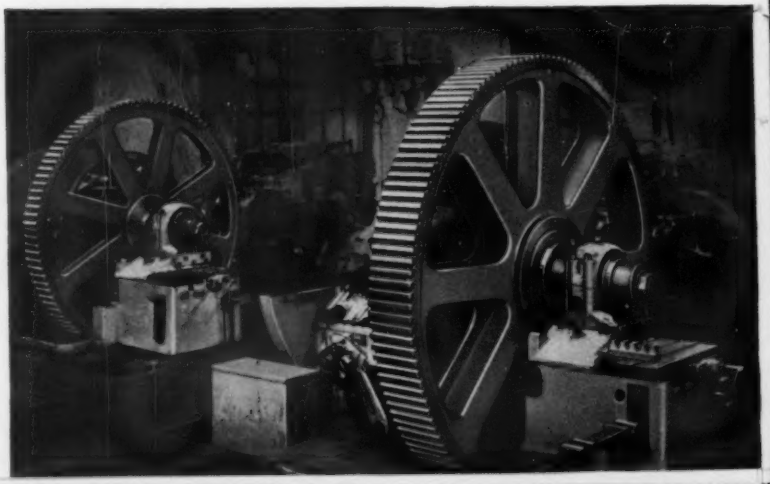
DAVID BROWN

THE DAVID BROWN CORPORATION (SALES) LIMITED

JACKSON DIVISION • SALFORD WORKS

HAMPSON STREET • MANCHESTER 5

Telephone Blackfriars 3577 (4 lines)

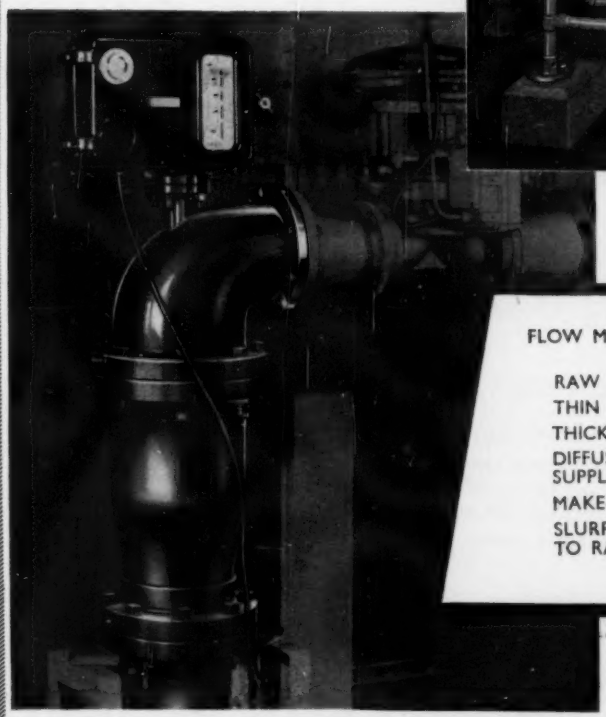


ROTAMETER

at WISSINGTON

Rotameter transmitting density meters and flowmeters are integrated into the Evershed and Vignoles electronic control system at the British Sugar Corporation sugar factory at Wissington.

These instruments are also available with pneumatic transmission.



FLOW MEASUREMENT
OF
RAW JUICE
THIN JUICE
THICK JUICE
DIFFUSION
SUPPLY WATER
MAKE-UP WATER
SLURRY RETURN
TO RAW JUICE

●Write for leaflets
SJ2007/11 and
SJ2042/11

ROTAMETER

FLUID MEASUREMENT AND CONTROL
FLOW-DENSITY-LEVEL

ROTAMETER MANUFACTURING CO. LTD., 330 Purley Way, Croydon, Surrey. *Tel*: CROydon 3816

G.11

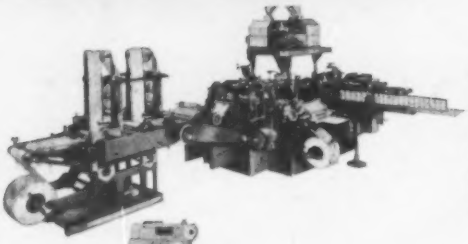
Sugar, **being a basic consumer commodity, does not permit high packaging costs.**

Therefore, cut packaging costs, to the minimum - pack automatically

HESSER

will show you the way.

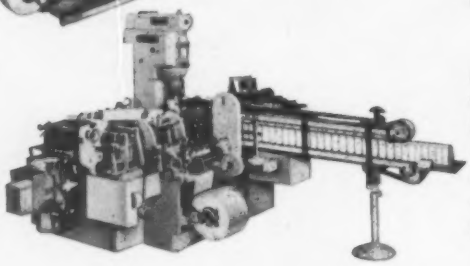
Output per 8 hour shift 2 persons in attendance



Machine Type PDHB(R)

equipped with 3 precision weighers makes up a lined bag, and fills and closes in one continuous operation. Up to three colour Aniline Printing attachment for printing the outer paper can be incorporated. This is the most economical way of manufacturing packages.

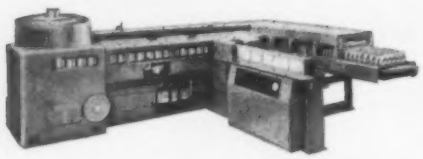
about **30000** packages



Machine Type PDHJ

with auger filling unit for icing-sugar.
Makes, fills and closes double packages consisting of inner bag and outer carton. Can be also arranged for heatsealing inner liner material. Direct connection with a cellulose film wrapping machine possible.

about **30000** packages



Machine Type PU IIIs

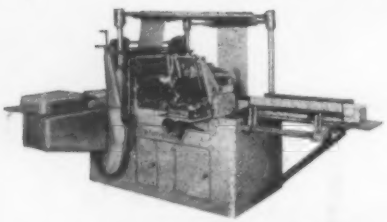
equipped with a plate type volumetric filler and working from the pre-glued skillets, which are opened, filled and closed, fully automatically.

about **120000** packages

Parcelling Machines

– can be supplied for direct coupling to packaging machines – thus contributing to lower packaging costs.

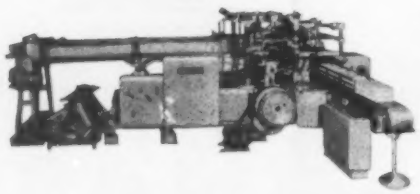
Output



Parcelling Machine Type SP

wraps a pre – determined number of individual packages into Kraft paper, which can be printed on the machine.

up to **72** parcels per min.



Parcelling Machine Type WXO

is working on the same principle as described for the machine type SP. Due to its higher capacity, the machine will take the output of several packaging machines.

up to **30** parcels per min.

162

The parcels produced on these machines have a tight wrap and being firm and resistant, lend themselves ideally to piling when storing.

Representative in the United Kingdom: **JAHN (MASKINER) LTD., 34 York Way, Kings Cross London N.1**

FR.HESSER MASCHINENFABRIK-AKTIENGESELLSCHAFT · STUTTGART-BAD CANNSTATT · FOUNDED 1861

I.S.J.

SUGAR BOOK DEPARTMENT

All books reviewed in this *Journal* may be obtained through our Sugar Book Department. Where no inclusive price is quoted in our review, 2s. 6d. should be added to cover the cost of packing and postage.

★ *Check your personal library against the list of basic books given below :*

		POST PAID
BASIC CALCULATIONS FOR THE CANE SUGAR FACTORY: *Eisner*	(1958)	**7s. 6d.**
PRINCIPLES OF CANE SUGAR MANUFACTURE : *Davies*	(1938)	**22s. 6d.**
CANE SUGAR AND ITS MANUFACTURE : *Geerligs* ...	(1924)	**32s. 6d.**
CANE SUGAR HANDBOOK (8th ed.) : *Spencer and Meade*	(1945)	**134s. 6d.**
SUGAR ANALYSIS (3rd ed.) : *Browne and Zerban*	(1941)	**183s. 6d.**
BEET SUGAR ECONOMICS : *Cottrell*	(1952)	**42s. 6d.**
POCKET SUGAR YEAR BOOK : *Int. Sugar Council*	(1957)	**11s. 0d.**
SUCRERIE DE BETTERAVES : *Dubourg*	(1952)	**84s. 6d.**
PRINCIPLES OF SUGAR TECHNOLOGY (Vol. I) : *Honig*	(1953)	**97s. 6d.**
(Vol. II): *Honig*	(1959)	**97s. 6d.**
TECHNOLOGY FOR SUGAR REFINERY WORKERS (3rd ed.): *Lyle*		**72s. 6d.**
LICHT'S INTERNATIONAL SUGAR ECONOMIC YEAR-BOOK & DIRECTORY	(1958-59)	**55s. 6d.**
SYSTEM OF CANE SUGAR FACTORY CONTROL (2nd ed.): *International Society of Sugar Cane Technologists*	(1956)	**13s. 9d.**

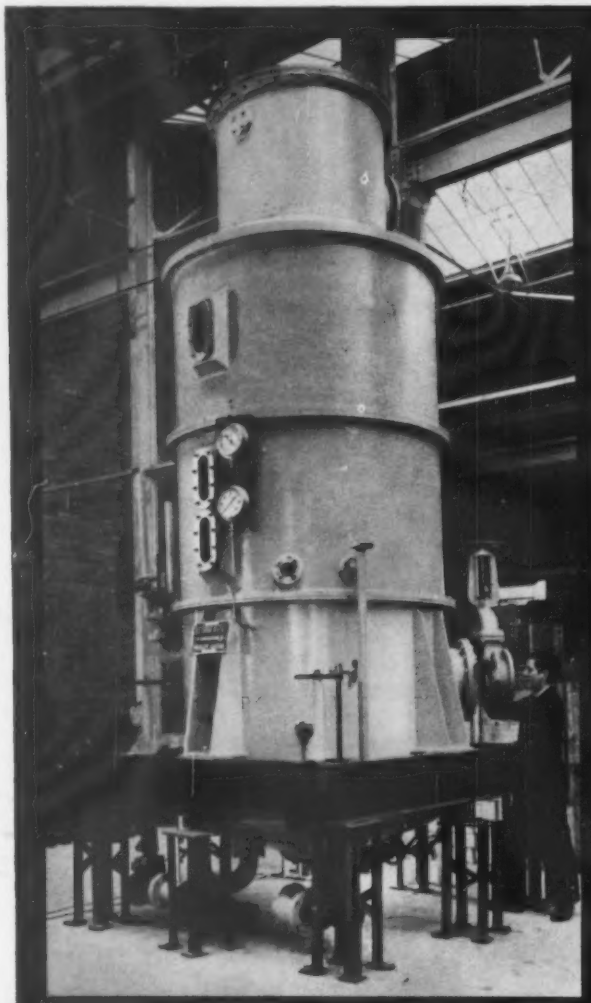
The above prices include postage and packing.

Terms are strictly cash in advance.

Our Bankers are : Barclays Bank Ltd., 3 Great Tower Street, London, E.C.3.

SUGAR BOOK DEPARTMENT, **International Sugar Journal, Ltd.**

Central Chambers, The Broadway, London, W.5.



Evaporators by *CRAIG

* *manufactures of machinery for Complete Sugar Factories.*

The vacuum pans illustrated are part of the machinery supplied by CRAIG for this sugar factory in India.

A. F. CRAIG & CO. LTD.

Head Office and Works: Caledonia Engineering Works,
PAISLEY · SCOTLAND
Telephone: Paisley 2191 Telegrams: Craig, Paisley
London Office: 727 Salisbury House, London Wall, E.C.2
Telephone National 3964

Your enquiries will have our prompt attention.

International Sugar Journal

VOL. 61 *December, 1959* No. 732

Editor and Manager :
D. LEIGHTON, B.Sc., A.R.I.C.

Agricultural Editor :
H. MARTIN-LEAKE, Sc.D.

Assistant Editor :
M. G. COPE, A.I.L.(*Rus*)

Panel of Referees

L. D. BAVER,
Director, Experiment Station, Hawaiian Sugar Planters' Association.

A. CARRUTHERS,
Director of Research, British Sugar Corporation Ltd.

F. M. CHAPMAN,
Technical Adviser, London Refineries, Tate & Lyle Ltd.

J. EISNER,
Technical Adviser, Booker Bros. McConnell & Co. Ltd

P. HONIG,
Consulting Sugar Technologist.

J. CAMPBELL MACDONALD,
Chief Technical Officer, British Sugar Corporation Ltd.

H. C. S. DE WHALLEY,
Consultant, Tate & Lyle Ltd.

O. WIKLUND,
Swedish Sugar Corporation.

* * *

Published by:
The International Sugar Journal Ltd.
Central Chambers, The Broadway,
London, W.5.
Telephone : EALing 1535
Cable : Sugaphilos, London.

* * *

Annual Subscription : 32s 0d. or $5.00 post free
Single Copies : 2s 6d or 45 cents post free

PAGE

Notes and Comments 353
U.K. Sugar Board Report, 1958/59. Cuban 1960 Sugar Crop. Indian Sugar Shortage. Consumer Evaluation of sugar.

* * *

Agricultural Articles :

The Sugar Industry of Uttar Pradesh and its Problems 355

Agricultural Abstracts 357

Agricultural Research in Jamaica 358
Annual Report, Research Department, The Sugar Manufacturers' Association of Jamaica, 1957.

* * *

General Articles:

New System of Evaporation in the Sugar Industry 359
The L.V. System.
By Dipl. Ing. W. G. de Proskowetz.

Loveland Sugar Factory, Colorado 362

The Fate of some of the Principal Amino-Acids of Cane Juice During Molasses Formation 364
I. Preliminary Tracer Studies with certain Carbon-14 Labelled Amino-Acids.
By W. W. Binkley.

* * *

Sugar-House Practice. 367
Fibre properties as Related to Milling Quality of Cane. Assessing the Degree of Cane Preparation. Two Rollers *vs.* Three Rollers. The Viscosity of Final Molasses. Use of Polyelectrolytes in Cane Juice Clarification *etc.*

Beet Factory Notes 370
Utilization of Reagents and the Neutralization of Juice after Ion Exchange Purification. New Loading-Carrying Vehicle for Bulk Loads—The Autoshovel AL-1-Tsins. Experience of Early Campaign Start. Regeneration of Lime *etc.*

New Books and Bulletins 375
Aluminium in Sugar Refining Equipment. Cane Sugar Factory Control. 2nd Edn. Bulk Delivery of Liquid Cane Sugar *etc.*

Laboratory Methods and Chemical Reports 376
Paper Chromatographic Studies on Sucrose Dissociation in Neutral, Alkaline and Acid Solution. Composition of Sugar Beet and Chemical Changes Occurring During Processing. Use of Radio-Isotopes in the Sugar Industry *etc.*

By-Products 379
The effect of Various Levels of Raw Sugar in Growing-Fattening Rations for Swine. Deionized Molasses for Poultry. A Study of the Possibilities of High-Test Molasses Production *etc.*

Patents 380
Beet Harvester Ejection Device. Purification of Sugars. Recovery and Dehydration of Sugar Beet Tops (for Animal Fodder). Continuously Fed Centrifugal *etc.*

Trade Notices 382
Sample Extractor. Flanged Ball Bearing Units. The "Flite-Flo" Conveyor. The H.17 Semi-Automatic Weighing Machine *etc.*

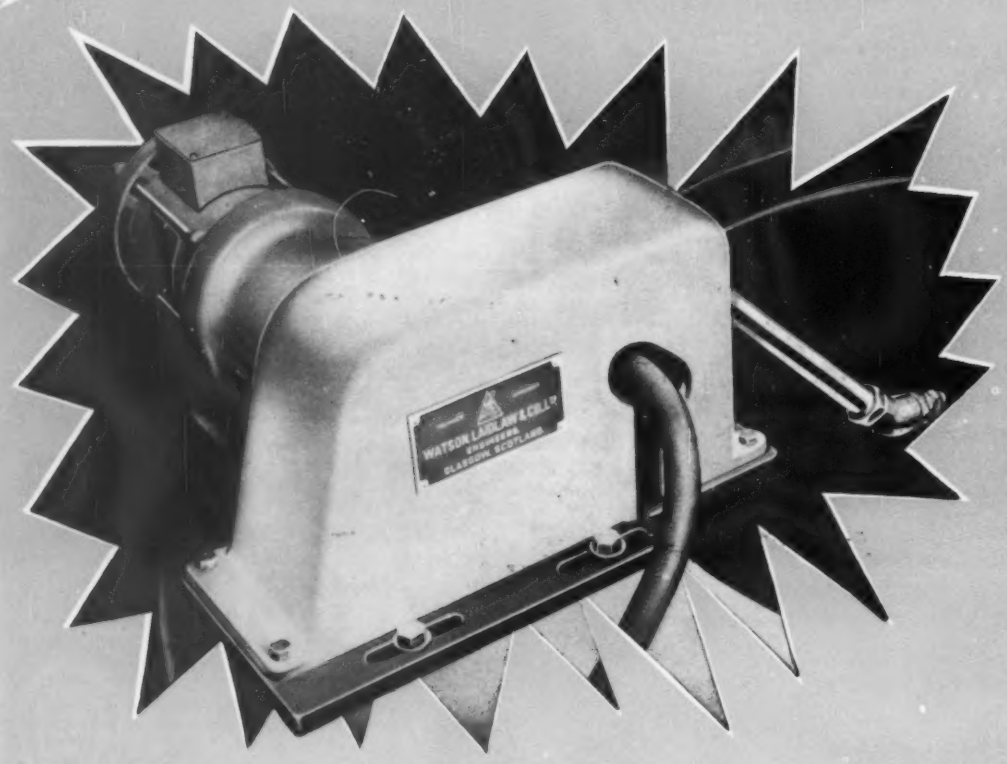
Brevities 383–4

Stock Exchange Quotations 384

Index to Advertisers lvi

and now **PACKAGED**

WASHING UNITS FOR YOUR CENTRIFUGALS



54 WASHING STROKES PER MINUTE
FROM A PRECISION MADE NOZZLE . .
SIMPLE TO INSTALL & MADE TO SUIT 48"x30", 48"x24", 42"x24", 42"x20", & 36"x18" BASKETS.

WATSON LAIDLAW
AND COMPANY LIMITED

Designers and Manufacturers of Modern Centrifugal Machines

98 LAIDLAW STREET, GLASGOW, C.5

Telephone SOUth 2545 *Telegrams* "FUGAL" Glasgow

WU/1

THE

INTERNATIONAL SUGAR JOURNAL

VOL. LXI DECEMBER, 1959 No. 732

CHANGE OF ADDRESS

The office of the International Sugar Journal Ltd. has been transferred to new premises so that from this issue our address is:—

CENTRAL CHAMBERS,
THE BROADWAY,
LONDON, W.5.

Our telephone number is EALing 1535, *while our telegraphic and cable address is unchanged, i.e.* "Sugaphilos, London".

NOTES AND COMMENTS

U.K. Sugar Board Report, 1958/59.

The Second Annual Report of the Sugar Board was published on 27th October after presentation to Parliament by the Minister of Agriculture, Fisheries and Food. The Report deals with the activities of the Board from 1st July 1958 to 30th June 1959 and includes an audited statement of the Board's Accounts for that period. The Sugar Board was set up under the Sugar Act, 1957, with the main functions of:—

(*a*) purchasing the negotiated price quota sugar the United Kingdom undertakes to buy under the Commonwealth Sugar Agreement and re-selling it to private traders at open-market prices;

(*b*) making good deficits incurred, or receiving surpluses realized, by the home beet sugar industry.

During the year ended 30th June 1959 covered by the Second Annual Report, the course of free market prices was almost continually downwards and the rate of Surcharge was increased on 22nd January 1959 by ½d per lb from 1¼d to 1¾d a lb (refined basis).

The Board's transactions during the year resulted in a surplus of about £700,000, arising from:—

(*a*) a net outgoing of £23 million on the purchase and resale of over 1½ million tons of Commonwealth sugar costing some £70 million, and of £10 million in respect of the production of about ¾ million tons of sugar by the British Sugar Corporation Ltd.;

(*b*) net receipts of £34 million in respect of Surcharge collected during the year.

After deducting the surplus for the year from the accumulated under-recovery of £7·6 million brought forward from the previous year, there remains a net under-recovery of £6·9 million to be carried forward to the next accounting period. The figure of under-recovery is well within the £25 million which the Act authorises the Board to borrow in order to avoid the necessity of making frequent changes in Surcharge to match the fluctuations in world free market prices.

* * *

Cuban 1960 Sugar Crop.

The Cuban Minister of Commerce, Senor CEPERO BONILLA, is reported[1] to have stated in the course of a television appearance in October that the 1960 crop will follow the pattern of recent years in that producers will not be free to make the maximum tonnage possible from available cane supplies. He said that no figure had yet been fixed but that the decision would be reached at a later date in the light of circumstances then ruling. So far as could be judged at the moment it appeared likely that it would be in the region of 5·5 million Spanish tons.

There can be no doubt that the size of the Cuban crop will have a very great bearing on 1960 price levels. Any suggestion that Cuba was considering an unrestricted crop could lead to a lack of confidence but, with European crops in many cases below average, a production in the Island carefully trimmed to meet the probable outlet might bring the price level well within the Agreement range.

[1] C. Czarnikow Ltd., *Sugar Review*, 1959, (427), 169.

Indian Sugar Shortage[1].

Considerable concern has been expressed in India in recent months that the possibility of a shortage of sugar may soon have to be faced. Consumption has been increasing rapidly in recent years and, by next season will, it is estimated, be in the region of 2·2 million tons, white value. Production, meanwhile, despite the undoubted improvements which have taken place within the industry, now appears unable to keep pace with demand and the authorities are faced with the alternatives of inducing the factories to achieve even greater outturns or of bridging the gap with imports.

From time to time the suggestion is made that the latter course will be adopted and, in fact, in late October a report appeared in a New Delhi newspaper that the importation of 50,000 tons was under consideration. This, however, has since been categorically denied by the Central Food Minister. Nevertheless, the Press report did give details of concessions which are to be offered to producers in certain provinces to induce them to commence grinding at an earlier date this year than usual. In Western Uttar Pradesh factories commencing operations before 4th November were to receive a special payment of 31 naye paise per maund, equal to 1s. 3d. per ton, on all cane ground up to 15th November whilst a similar payment was to be made to factories in Eastern Uttar Pradesh and North Bihar on cane crushed prior to 21st November, provided a start is made by 15th of that month.

The report also mentions the possibility that the Government will consider revising the scale of payments for cane so as to provide an incentive to increase sucrose contents.

The change in India's role from seller to possible buyer has been quite remarkable. As recently as the Geneva Conference held in October of last year India felt unable to accede to the International Sugar Agreement on the grounds that the export quota of 100,000 metric tons, raw value, which was offered her was insufficient whilst early this year permission was granted for 25,000 tons to be exported. This was at the time thought to be an interim measure to be followed by additional authorizations as the season progressed but in fact only about 19,000 tons had actually been contracted before an embargo on further business was enforced. As matters stand at the moment the possibility of further exports being permitted in the immediate future seems remote, except, perhaps, under trade agreement to Nepal and then only to the extent of about 2500 tons per year.

* * *

Consumer Evaluation of Sugar.

Consumer Association Ltd. is a non-profit organization whose income comes from membership subscriptions. It is based in London and publishes a monthly booklet called "Which?" giving the results of its comparison and assessment of goods which it has bought and tested. These goods, ranging from aspirins to washing machines, are discussed and usually individually evaluated, a "best buy" being selected which the Association consider the best value for money.

In the October 1959 issue of "Which?" the Association have considered the subject of sugar sold in Great Britain.

Not the brands, but the types of sugar were investigated by C.A.: granulated, caster, lump, icing, preserving, coffee, Barbados, Demerara, pieces.

"Which?" says that granulated sugar, normally the cheapest, is as good as any of the other sugars in nutritional value and sweetening power. In terms of how much sugar you get for your money, "Which?" finds it obvious that the very small differences in percentage of sucrose do not affect the value of the different sugars. The differences are chiefly of convenience or of flavour.

The difference between granulated and caster, apart from the price, lies in the size of the white crystals into which the sugar liquor of either beet or cane is refined. Lump sugar is made by producing a slab from the wet crystals, cut after drying, and the irregular lumps rejected after the cutting process are sold as preserving sugar. This costs 10½d a lb as against 8½d a lb for granulated sugar, and "Which?" finds it difficult to see why anyone should pay the extra money for no extra value or convenience.

Coffee crystals cost about 9d a lb more than lump sugar. They are the same in composition and sweetening power, but dissolve more slowly. "Which?" says that any gourmet who can persuade himself that he likes the first sips of black coffee bitter, the rest sweetened, will presumably find it worthwhile to pay the extra.

Both cane and beet sugar are nearly all pure sucrose, and all the white sugars, except icing, contain at least 99·9% of sucrose. All have the same power to sweeten but "Which?" explains that the finer sugars, since they dissolve more quickly, sometimes *seem* to be sweeter when eaten dry.

The brown sugars tend to be more expensive than white and differ in flavour, but C.A. states that there is no foundation for the common belief that brown sugars have nutritional properties significantly superior to those of white sugar.

Sugar Production in Ethiopia.[2]—Sugar production of the Wonji estate and factory was 35,859 tons in 1958/59 compared with 32,504 tons in the previous year and 26,050 tons in 1956/57.

* * *

Beet Sugar in Pakistan.[3]—A beet diffuser has been supplied by Buckau R. Wolf A.G. to Charsadda, West Pakistan, and will process up to 2000 tons of beet per day during June and July after the sugar cane crop is finished. In the short trial campaign of 1959 a continuous D.d.S. diffuser was used, the juice being carbonatated and further processed in the cane sugar factory, due modifications being made to the conditions of temperature, etc.

---

[1] C. Czarnikow Ltd., *Sugar Review*, 1959, (428), 173–174.
[2] F. O. Licht, *International Sugar Report*, 1959, **91**, (Supp. 16), 214.
[3] *Zeitsch. Zuckerind.*, 1959, **84**, 471.

THE SUGAR INDUSTRY OF UTTAR PRADESH AND ITS PROBLEMS

IN his Presidential Address at the 5th Annual General Meeting of the Indian Sugar Mill Association, U.P.[1], S. S. KANORIA gave a somewhat depressing account of the present position of the sugar industry in Uttar Pradesh, which is described as one of decline; in fact, he states that, "unless some determined action is undertaken to stop the rot, the situation will deteriorate beyond hope of recovery". Some measure of the deterioration is given by the fact that in 1932, when protection was introduced, the U.P. and Bihar produced 90% of India's sugar; in 1953-54 they produced 71% (U.P. 56%, Bihar 15%). In the last two seasons ('57–'58 and '58–'59) the U.P. share has fallen to 47·7% and 44·3% and, from the figures given, it would appear that this shrinkage in the Province's share of the total production is due as much to reduced local production as to expansion elsewhere. This latter expansion has not been negligible and has rendered it increasingly difficult to market excess U.P. production outside the Provincial boundary. The reasons, given in some detail, for this rather depressing situation are numerous and have an interest extending beyond the particular area; they are of particular interest to the writer who served for over 20 years in the U.P. covering the period when the early Coimbatore varieties were introduced by G. CLARKE, and who 40 years ago held the post of Director of Agriculture of that Province.

Prominent among the causes given is the "mushroom" growth of a khandsari industry following a tremendous increase in excise duty. Owing to khandsari competition factories which have gone to great expense in expansion of their capacity are unable to secure sufficient cane for their normal crush. That applies especially to the Western Districts; in the East factories have sprung up haphazard and would lack adequate supplies of cane if expanded for economic working. At an average of 837 tons, these factories have the lowest daily crushing capacity of any Province. The remedy proposed here is the shifting of the khandsaris, by subsidy if necessary, from the area from which factory supplies may be drawn.

On the agricultural side, attention is drawn to the low yield of cane and its poor quality. The 1948/49 figure for the former, the date when the development scheme commenced, was 12·7 tons, a figure little in excess of that before the introduction of the Co varieties and, in the 4 years ending 1956/57, yield has ranged between 15·4 and 18·8 tons. One reason suggested for this low yield, as well as for the low recovery, which had slowly risen to 9·93 in 1957/58, is inadequate research. That is probably true, but is only part of the story, for G. CLARKE has recorded[2] securing on his farm at Shahjahanpur, year in, year out, over a period of 20 years, yields of just under 37 tons.

The advantage of those early Co varieties, as shown by the Saharanpur results, lay not in their actual yield under peasant cultivation, but in their potential yield, obtainable only under conditions of high fertility. Accepting standard fertility, the varietal problem consisted in securing varieties capable of such increased yields under the cultural conditions inherent in a peasant system. Behind the varietal problem is the more fundamental problem of raising the permanent fertility of peasant holdings to a degree that enables the high yielding varieties to develop their innate capacities. Largely this is a question of the organic status of the soil, and CLARKE attained that end by the liberal use of crude city (Shahjahanpur) wastes; the work of N. R. DHAR and of the composting movement have shown other methods; but the road is long and difficult.

Added proof of where the fundamental problem lies comes from other crops, notably wheat, for it is not sugar cane alone that exhibits this failure to attain the potential yield. About 1910 the first Pusa wheats were introduced to the U.P. and several became the standard wheats of the Province, displacing almost entirely the indigenous varieties. On the Government farms they gave vastly increased yields, partly because of innate capacity but also because under the conditions of higher soil fertility, the indigenous varieties gave a rank growth with weak straw incapable of carrying the extra load. But they, too, were unable to develop that capacity in peasant hands as shown by the average Provincial yield for the 5 pre-war crops, which was slightly (insignificantly so) below the average yield for the 5 years 1896–1900.

Other limiting factors, no doubt, exist, such as the inadequate irrigation facilities to which the author makes reference, but he lays his finger on the major cause of the inadequacy of the cultural system under which cane is grown when he says "one of the main difficulties with regard to cane development is the small holdings of the growers". With modern development, mechanization, the use of fertilizers and so on, not only is the small holding uneconomic in size but there is a lack of capital which renders even the maximum use of organic wastes beyond the peasants' means. In the present condition of flux, any reorientation of an agricultural economy must take cognizance of the fact that the size of the economic unit is not stable. Whatever the social disadvantages of the latifundia typical of so many countries including the zamindari of the U.P.—and they are many and great—it may well be that their breaking up under present-day emotional stresses may prove an even greater evil. India and the U.P. in particular—for it is in that Province that the zamindari system reached its fullest development—have not escaped this movement which has swept through many countries and of which the latest example is to be found in Cuba. In the U.P. the zamindari system has been swept away and a Planning

[1] *Indian Sugar* 1959, **9**, 37–45.
[2] *I.S.J.*, 1948, **50**, 174.

Commission has recommended a system of land ceilings. That an easy conscience does not exist in this matter is indicated by the statement that the U.P. Government have given their assurance that farms which are mechanized and have higher production, will not be brought within the purview of these ceilings.

The difficulties inherent in securing high yields and efficient production under a system of small holdings are well known. The most common solution of the problem has been sought in co-operation. After decades of trial, it has become sufficiently clear that co-operation offers no real solution. At its best it develops a static agricultural community. Its only real success has been in Denmark under the peculiar conditions of a canalized export market. It is peculiarly ill-adapted for a sugar industry where a costly factory, requiring a regulated supply of cane throughout the season of manufacture, is involved; for, as the author notes, it interposes an agency with other interests between the grower and the factory. An even more fundamental objection to co-operation when applied to a largely illiterate peasantry is that co-operative policy is dictated by considerations other than such as aim at maximum production; the co-operative department, as the provider of finance, is the final arbiter in the choice of approved schemes, but lacks the technical knowledge on which that choice should be based.

But if co-operation provides no answer to the problem, where is an answer to be found? A co-operative society is one of individuals of like status; it has to look externally for advice both in technique and finance. Too often, and inevitably in the case of a peasantry lacking education, those advisers become masters; the interest of the peasant suffers and, in consequence, results fall far short of expectation. To this the low yields of cane bear witness. A healthy agriculture requires that the primary producer, whether of grain, fibre, oil-seed or sugar shall share in the fortunes of those handling or processing the produce. That involves a co-operation between individuals of differing status or, to make the distinction clear, replacement of co-operation by co-partnership.

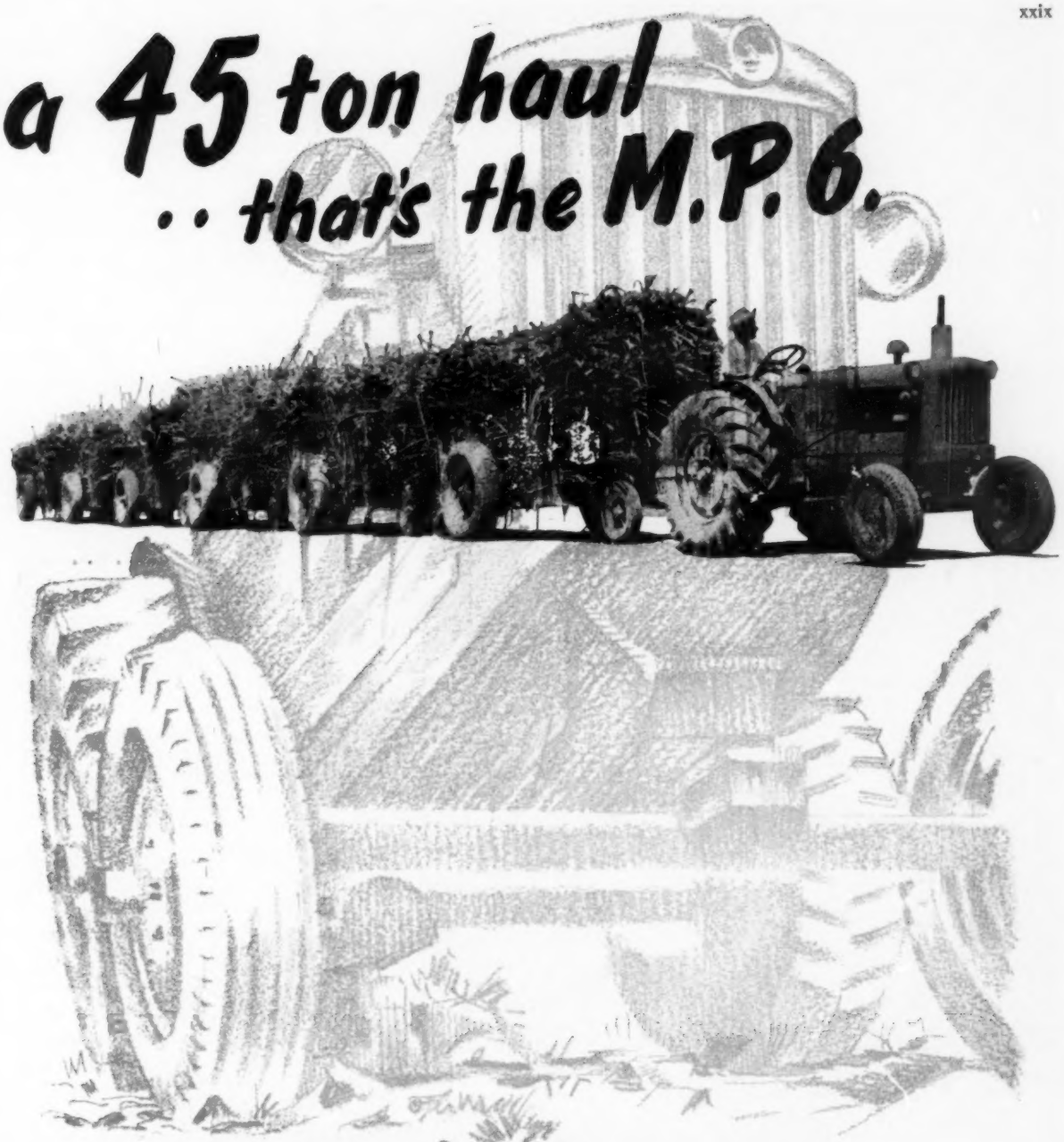
Agricultural co-partnership is most clearly seen in its simplest form; of an Association owning land, which it leases in areas of economic extent to cultivators, farmers or peasants, on conditions which ensure an adequate area under the particular crop or crops in the produce of which the Association is interested It pays to the cultivator a sum down on receipt of the produce and a further sum calculated on the degree of success of the enterprise. It is not a system based on theory but one which owed its origin to severely practical considerations. It has been tried out on a large scale and found not wanting under two very different circumstances. It is the basis of the vast Gezira Cotton Scheme in the Sudan which has survived the stresses of two generations of world upheaval with the minimum of political unrest and it owes its success largely to the sense of security imparted by the terms of tenancy. It is the basis, too, of the Fiji sugar industry, where the history of its development is particularly enlightening as indicating the importance of the profit sharing element. The recent introduction of the system on a sugar estate in British Guiana[3] will be watched with interest. Of even greater interest to a sugar industry run, as is that of the U.P., under a peasant system, is the fact that in Fiji alone is the yield from the peasant tenantry equal to that from direct estate cultivation.

The application of these co-partnership principles to U.P. conditions raises certain somewhat complex problems. In both the above cases it was possible for adequate land to pass into direct ownership for management on estate principles, but such is not the case in the U.P.; both, too, are in essence based on monoculture Nevertheless, the problem should not be, and certainly need not have been, insoluble. As noted, the U.P. was essentially a zamindari (landlord) Province, the zamindars deriving their title in various ways, perhaps the most general of which was as revenue collectors in the days of the Moghul Empire at the zenith of its power. With that origin, it was not surprising that their general attitude was one giving priority to the revenue yield of their estates with little direct interest in their management. That, however, was a mental outlook and capable of change, though the change must necessarily be slow, involving perhaps a generation or more. It was in an effort to produce that change that, about 1915, a zamindari course was opened at the Agricultural College, Cawnpur, to which only sons of zamindars were admitted and of which the key instruction was in co-partnership principles as between the zamindar, taking a personal interest in his estate and its development, and his tenantry. In those early days the course proved a great attraction which, given social peace, might well have changed the course of agriculture in the U.P. But that peace was not forthcoming; the entire zamindari system has been abolished and the land divided, with a ceiling to the amount it is permissible to hold. This abolition may well prove India's tragedy for it ignores that ancient motto, inherent in the zamindari course, "festina lente".

In what manner the co-partnership principle can be built into the present structure of Indian agriculture only those in possession of the full facts can say. Meanwhile some steps need to be taken to relieve the situation of the U.P. sugar industry as described by the author. One of the major difficulties noted by him is the short working season. But cane is not the only plant yielding sugar and he makes no mention of beet. Yet in that vast sub-tropical tract extending from Taiwan in the East to Morocco in the West, beet affords an alternative to cane and has not only been grown experimentally and in commercial cultivation but has, in the last few years, been grown concurrently with cane with the definite purpose of extending the manufacturing season. It is possible that beet might fill the gap.

[3] *I.S.J.*, 1957, **59**, 173: 1959, **60**, 250.

a 45 ton haul .. that's the M.P.6.

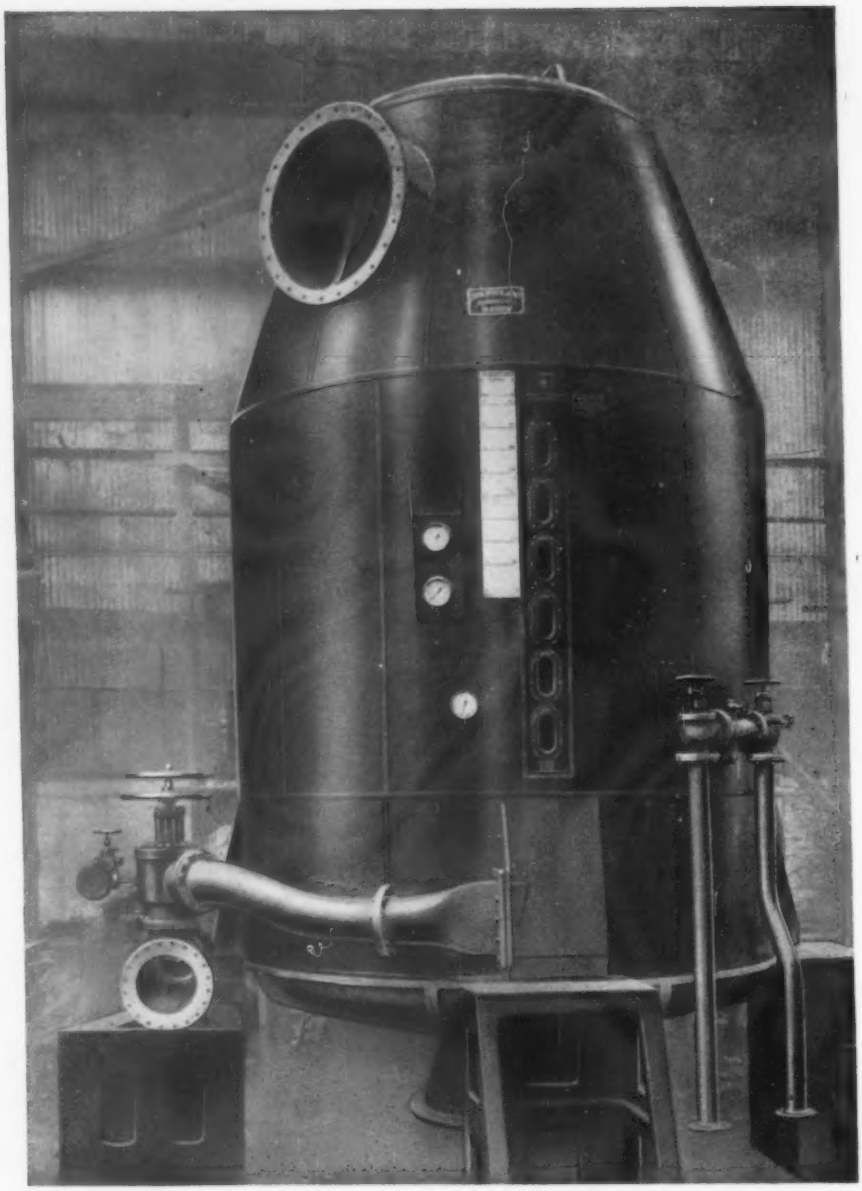


saves time .. & money

Day in, day out, with complete reliability, Marshall M.P.6 tractors haul over 36 tons of sugar cane at a time.

Hauling these loads from the fields over unsurfaced roads at economic speeds, the M.P.6 provides an economical means of keeping the sugar factories supplied.

MARSHALL SONS & CO., LTD. GAINSBOROUGH, LINCS.



12 ft. diameter
CALANDRIA PAN
2050 SQ. FT. H.S.
45 TONS CAPACITY

JOHN McNEIL & CO. LTD.

COLONIAL IRON WORKS,
GOVAN,
GLASGOW, S.W.1.

Telephone Nos. GOVAN 1246-7-8

Telegraphic Address "Colonial, Glasgow"

It is, perhaps, not generally known, for no published record exists, that beet has been grown in Bihar, bordering the U.P. About 1930, when the Indian sugar industry was in a depressed condition, at the instigation of the present writer, who supplied the seed, a series of trials covering two or three seasons were laid down in that province. The resultant data are now not available but yields were of the order of some 20 tons per acre and sucrose content satisfactory. If commercial production was not attained, it was because of the introduction of protection in 1932 and the consequent diversion of all energies to sugar cane. Beet is essentially a crop adapted to a peasant system where labour, on which it makes extravagant demands, is not a fully cash item in the account. Its harvesting period coincides with the termination of the cane harvest and the additional factory requirements to handle beet involve relatively small additional cost.

H.M.-L.

AGRICULTURAL ABSTRACTS

Advice about sowing sugar beet seed. ANON. *Suikerbiet* (Holland), 1958, **11,** 64–66.—Polyploid strains of sugar beet have larger seed clusters than most diploid strains. Therefore the quantity or weight of seed required to produce a good stand alters with variety. The percentage of seed clusters producing single seedlings and the relative quantity of seed required for several different varieties to produce the same plant stands as the variety "Hilleshög Standard" are given.

* * *

Determination of the degree of polyploidy in sugar beet by counting the chloroplasts in the guard cells. T. BUTTERFASS. *Züchter*, 1958, **28,** 309–314.—The Japanese method of counting the number of chloroplasts in the guard cells of the stomata of the leaf is the quickest way of distinguishing between diploid, triploid and polyploid sugar beet. This paper describes improved techniques for making chloroplasts more easily visible. Examination under the fluorescence microscope was most effective, the chloroplasts exhibiting a red fluorescence when irradiated with blue light.

* * *

A Cane Truck Trailer. H. G. KNUST. *Cane Growers' Quarterly Bull.*, 1959, **22,** 117–118.—An improved trailer is described. Full rail trucks are loaded onto the trailer by a winch.

* * *

Mosaic Disease—A Lesson from Louisiana. C. G. HUGHES. *Cane Growers' Quarterly Bull.*, 1959, **22,** 121–124.—From the occurrence in 1943 of a new strain of mosaic in Louisiana which severely attacked locally-bred varieties which were highly resistant to the normal strains, the moral is drawn that only complete elimination of mosaic must be the objective. At present such strains as exist in Queensland have been shown to be relatively mild, but the prospect of a virulent strain developing cannot be ruled out.

* * *

Use BHC Fertilizer Mixtures with Care. I. T. FRESHWATER. *Cane Growers' Quarterly Bull.*, 1959, **22,** 130–131.—Trouble may arise in the form of suppression of root development if a BHC-fertilizer mixture is distributed over setts still wet from mercurial treatment.

* * *

An Animal Pest of Sugar Cane. G. WILSON. *Cane Growers' Quarterly Bull.*, 1959, **22,** 132–133.—Among mammalia, rats are recognised as serious pests of sugar cane. In the northern areas of Queensland considerable damage has now been traced to the striped phalanger, *Dactylopsila picta*, described here.

* * *

Ploughing versus Discing of Green Manure Crops. S.O.S. *Cane Growers' Quarterly Bull.*, **22,** 137.—The brief note recalls the lengthy arguments in FAULKNER's "Ploughman's Folly"[1] and CAREW's "Ploughman's Wisdom"[2]. The critical point is that the organic residues should be placed where conditions for aerobic decomposition are at an optimum; that point will differ in depth according to the nature of the soil and no standard can be laid down.

* * *

Sugar Cane Variety Trials in Puerto Rico, 1952-57. F. MÉNDEZ-ROIG *et al. J. Agric.* (Univ. Puerto Rico), 1959, **43,** 1–18.—The results of 24 experiments conducted in different areas of the territory and of the 51 crops grown during the 6-year period are reviewed. Of the 8 areas into which the territory is divided, PR 980 was outstanding in the S., W., and Interior, with B 37161 leading in the E. and the Caguas Valley. The latter tied with PR 980 in the N. Central, and with B 41227 in N.E. areas.

* * *

The Response of Two Sugar Cane Varieties to Fertilizers. P. LANDRAU *et al. J. Agric.* (Univ. Puerto Rico), 1959, **43,** 73–88.—Of two varieties, B 41227 and M 336, grown on Vega Baja silty clay at Rio Piedras, 5 crops were taken. The results, including leaf and sheath determinations, are given in considerable detail. Certain varietal differences in response are noted.

[1] *I.S.J.*, 1945, **47,** 93.
[2] *I.S.J.*, 1949, **51,** 326.

AGRICULTURAL RESEARCH IN JAMAICA

Annual Report, Research Department, The Sugar Manufacturers' Association of Jamaica, 1957.

Irrigation

STUDIES in overhead irrigation include the improvement of rainers to give an adequate uniformity of distribution. At the normal spacing of 160 ft, uniformity is low, but it is hoped to attain a satisfactory distribution at spacings of over 120 ft. The possibilities of using polyethylene as a saving even on quick-coupling, portable aluminium pipes, raise problems of internal diameter, water pressure, wall thickness and flexibility.

Normal irrigation, of which data of an experiment at Monymusk are given, is discussed on the basis of "inches deficit", a figure based on the evapo-transpiration figure for cane and the evaporation from a free water surface as formulated by H. L. PENMAN. In the experiment, irrigation at 2 inches deficit increased the yield of cane by 16% and of sugar by 14% over irrigation at 3·4 in deficit; no further increase was obtained from irrigation at 1·2 in deficit.

The normal system of irrigation at half-chain intervals appears to be suited to present conditions, but improvement, particularly in water economy, will result from better grading and, in the case of ratoons, distribution of trash.

Nutrition

"Nutrition" is here used in its broadest sense and includes trials with fertilizers in which a departure is made from the conventional factorial system, the component blocks being located in different fields. There is a trend towards increased P_2O_5 and K_2O dressings, with those of N unchanged, and evidence so far suggests no serious deficiencies of trace elements.

An analysis is given of 124 crop logging experiments in which the normal fertilizer dressing is compared with additional dressings of various kinds, determinations being made with additional dressings of various kinds, determinations being made of leaf and sheath composition at 7 stages between 3 and 12 months and of stem elongation at weekly intervals. The broad conclusions, drawn from this complex series, covering irrigated areas and 3 areas of differing intensities of rainfall, include the over-riding effect of age on growth rate, which is significantly correlated with sheath moisture, and leaf N, P_2O_5 and K_2O.

In 12 experiments, urea was found to give only an 80% response with sulphate of ammonia = 100. With late (at 4·5–8 months' age) applications of sulphate of ammonia through overhead irrigation, an overall increase in yield of sugar resulted, the extra cane more than compensating for the depression in juice quality.

To summarize, greater use is being made of leaf analysis as a guide to fertilization, and the possibility of using small micro-plots, carrying extra dressings, for comparison with the normal fields is being explored.

Cultural and Miscellaneous Studies

The varied group reviewed here include the turning under of trash, the merits of deep tillage on heavy soils, and the effect of in-field transport on yield and root distribution under varying soil conditions. Standover cane shows a 30% loss not made good by dressings of N.

Varieties

The overall varietal picture shows a sharp decline in the area of B 3439 and B 34104 reaped, with compensating rise in the area of B 41227, B 4362 and B 42231, but the picture is confused by varietal adjustment to ecological conditions. The results of the many varietal trials are given in extensive tables.

Diseases and Pests

No studies of individual pests or diseases are recorded and the experimental work is limited to preliminary trials with insecticides and fumigants applied either before or after banking (Louisiana system) and with a 10 day interval to planting. The responses, measured by weight of an index leaf, were beneficial to the order of 12%, with a maximum in the case of B 4362 from D.D. at 40 gallons (U.S.) per acre. In one experiment on a commercial scale the same dosage of D.D. with 3 tines at 15 inches interval per bank gave a tenfold increase (in weight) of cane at 4 months. The reason for the increase, whether due to soil sterilization in general or to control of soil pathogens, requires investigation.

The concluding pages (pp. 34–86) give very detailed tabular summaries of the several items and experiments covered by the Report.

H. M.-L.

How Hilo Trailers Developed. R. J. LEFFINGWELL. *Cane Transport News*, 1959, **2**, (3), 2 & 4.—An interesting account is given of the origin and development of these trailers to their present efficiency. The same issue contains brief notes on trailer development in general and, in particular, of a mill-yard mule which adds to the efficiency of the trailer when used for mill-yard storage.

* * *

Interplanting Sugar Beet with Autumn Paddy and Autumn Sugar Cane. H. CHANG. *Taiwan Sugar*, 1959, **6**, (3), 15–20.—Earlier reported results[1] of the successful interplanting of beet are confirmed by the later experience here recorded. The rice-beet cultural sequence is: rice planted end July, beet planted early October, rice harvested November, beet harvested mid-February. Where sugar cane is included, the sequence is rice, sugar cane interplanted with beet following the rice as soon as it is harvested.

[1] *I.S.J.*, 1959, **61**, 7.

NEW SYSTEM OF EVAPORATION IN THE SUGAR INDUSTRY

The L.V. System

By DIPL. ING. W. G. DE PROSKOWETZ

PART I

EVAPORATORS are generally arranged so that the heating surfaces decrease with increasing Brix of juice. Intermediate vapours are drawn off for heating and pan boiling; but the main purpose is to evaporate the requisite amount of water. For example, in 1957/58, Allscott sugar factory (5 bodies; steam consumption 50% on beets; 38% made up exhaust steam to the first body) evaporated roughly 111% on beets from 140% of thin juice. As can be seen from Fig. 1, 38% of vapours were drawn off.

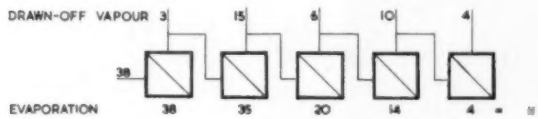


FIG. 1. ALLSCOTT 1957/58

In the new system, which is known as the L.V. (Last Vapours) system, no intermediate vapours are drawn off and only the last vapours are used. In this way the required evaporation can be attained with less steam supplied to the first body. Let us assume that Allscott could reduce the steam demand by 7% on beets by using juice heating by condensate in addition to that by vapour. With the current system, this would result in an insufficient evaporation of only 83% on beets. But with the L.V. system, by introducing only 28% into the first body and reducing the evaporator to four effects instead of five, an evaporation of 112% is obtained with 28% of last vapours (Figs. 2 and 3).

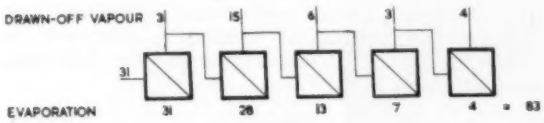


FIG. 2.

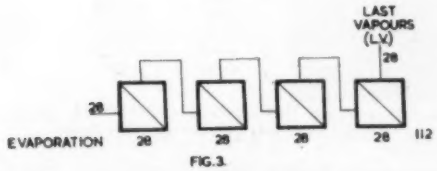


FIG. 3.

Thus the L.V. system enables the factory to reduce steam consumption considerably. As last vapour is used for heating and pan boiling, its temperature must be made adequate. Therefore the temperature differences between bodies must be made small and the heating surfaces will have to be increased from first to last body. The evaporation will be practically the same in all bodies, resulting in clear mathematical proportions and easy control of the whole system.

It may not be necessary to make up the exhaust steam for the first body; on the contrary, there may be a surplus of exhaust steam if the production of electric current is high. In the Allscott example, electricity production is 2390 kW and with an average slice of roughly 100 tons/hr and 50% steam on beets, there was in fact a shortage of exhaust steam which totalled roughly 37 tons/hr or 15·5 kg/kWh. With 43% steam on beets only a very slight make up would be used and if the total steam consumption were to decrease to, say, 38%, the position would become marginal. Thus in the case of extremely low steam consumption, turbines with a smaller steam demand would have to be installed.

In Fig. 4 is shown a plan for a total steam consumption of 32·65% on beet which may be further reduced by not using the heat transformer. The last vapours left over for the pans total 18·3%. This seems a very small quantity but, in the 1957/58 campaign, four British white sugar factories did not need more. (See Table I).

Table I.

Water to be evaporated in the pans, depending on the amount of massecuite and Brix of the syrup to be evaporated.

Massecuite of 91°Bx (% on beet)		50	52	54	56	58	60
Apparent dry substance (% on beet)	....	45·5	47·3	49·1	51·0	52·8	54·6
Syrup Brix							
60	Syrup (% on beet) ..	75·8	78·8	81·8	85·0	88·0	91·0
	Water to evaporate (% on beet)	25·8	26·8	27·8	29·0	30·0	31·0
62	Syrup (% on beet) ..	73·4	76·5	79·2	82·3	85·1	88·2
	Water to evaporate (% on beet)	23·4	24·5	25·2	26·3	27·1	28·2
64	Syrup (% on beet) ..	71·1	74·0	76·7	79·7	82·5	85·5
	Water to evaporate (% on beet)	21·1	22·0	22·7	23·7	24·5	25·5
66	Syrup (% on beet) ..	69·0	71·7	74·5	77·2	80·0	82·9
	Water to evaporate (% on beet)	19·0	19·7	20·5	21·2	22·0	22·9
68	Syrup (% on beet) ..	67·0	69·7	72·3	75·0	77·7	80·4
	Water to evaporate (% on beet)	17·0	17·7	18·3	19·0	19·7	20·4
70	Syrup (% on beet) ..	65·0	67·6	70·0	72·8	75·4	78·0
	Water to evaporate (% on beet)	15·0	15·6	16·0	16·8	17·4	18·0

The first heater from the right uses pan vapours, the second uses last vapours, the third uses flash and the last uses exhaust steam. Two steam accumulators are provided, the second forming part of the L.V. system, supplying the quantity of steam lacking for

the pans (see under "Control of the system"). As will be seen later, there should always be a shortage of steam for the pans using the L.V. system and not a surplus.

As already mentioned, the heating surfaces increase from first to last effect. On the other hand, the Brix of the intermediate juices is lower, the temperature higher, and therefore the heat transfer rate (k) is higher. Because the Brix increases slowly in the first stages but rapidly in the last, it is advantageous to use three vessels for the last effect. Data for a quadruple effect evaporator using the L.V. system are given in Table II, assuming 130% thin juice on beet of 13°Bx, total evaporation 104% and heating steam at 3·6 atm absolute pressure, corresponding to 139°C. The heat transfer rate (k) and condensate temperatures were calculated using the formulae of H. SPEYERER[1,2].

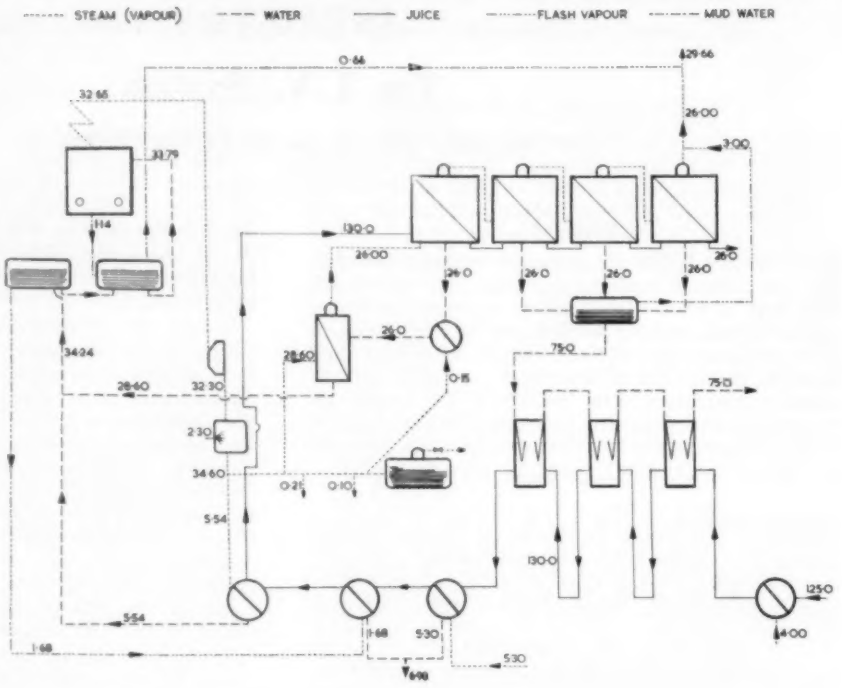


Fig. 4.

Table II.

Effect	Temp. Difference	b.p.e.	Vapour temp.	Condensate temp.	Brix
I	$\frac{26 \cdot 513}{0{\cdot}93 \cdot 3600}$ = 4·0°C	0·4°C	134·6°C	138·0°C	16·3°
II	$\frac{26 \cdot 520}{1{\cdot}35 \cdot 2500}$ = 4·0°C	0·6°C	130·0°C	133·3°C	21·6°
III	$\frac{26 \cdot 520}{2{\cdot}00 \cdot 1700}$ = 4·0°C	1·5°C	124·5°C	129·0°C	32·6°
IV	$\frac{26 \cdot 522}{2{\cdot}40 \cdot 800}$ = 7·0°C	4·8°C	112·7°C	122·7°C	65·0°

For Allscott factory the present heating surface of about 5000 sq.m. would be increased sharply to about 6800 sq.m. Naturally the thick juice will leave the last body at a very high temperature and must be flashed down to a convenient temperature for boiling in the pans. The flash vapour can be used for heating syrups. The temperature of the heating steam must be fairly high if excessive heating surfaces are to be avoided, but 139°C, as in the example above, seems to be adequate.

There are objections to the use of high temperatures in the evaporators, but for practical purposes these are not very serious. This question was treated thoroughly at the London Conference of the C.I.T.S. in 1957[3,4] and by CARRUTHERS *et al.* at the 1954 Conference of the British Sugar Corporation[5], and the following points emerge from these papers: (*a*) during evaporation, invert is formed and destroyed in all effects; (*b*) the concentration and pH of the juice partly govern the amount of residual invert; and (*c*) the decisive factor is the time during which juices are exposed to high temperatures.

THOMPSON and his collaborators[6] found that in the pans, where the sugar liquor stayed six hours at a temperature of 70°C, the total amount of sucrose lost was 1·41% on the original sucrose content, and the amount of reducing substances, expressed as invert, was 1·24%. LOOPUYT[4] found the following values:

	Total invert on Brix	Temperature	Increase or decrease
Thin juice	0·10	132°C	—
1st effect	0·18	132°C	+0·08
2nd effect	0·26	122°C	+0·08
3rd effect	0·32	116°C	+0·06
4th effect	0·14*	102°C	—0·18*

*Here the author thinks that there must have been an error. No retention times were given.

[1] Technologie des Zuckers. (Schaper, Hannover). 1955. p. 629.
[2] *Ibid.*, p. 655.
[3] VERHAART and DE VISSER: *I.S.J.*, 1957, **59**, 347.
[4] LOOPUYT: *I.S.J.*, 1957, **59**, 243.
[5] *I.S.J.*, 1954, **56**, 218.
[6] *I.S.J.*, 1957, **59**, 213.

BLAIRS

COMPLETE

SUGAR

FACTORIES & REFINERIES

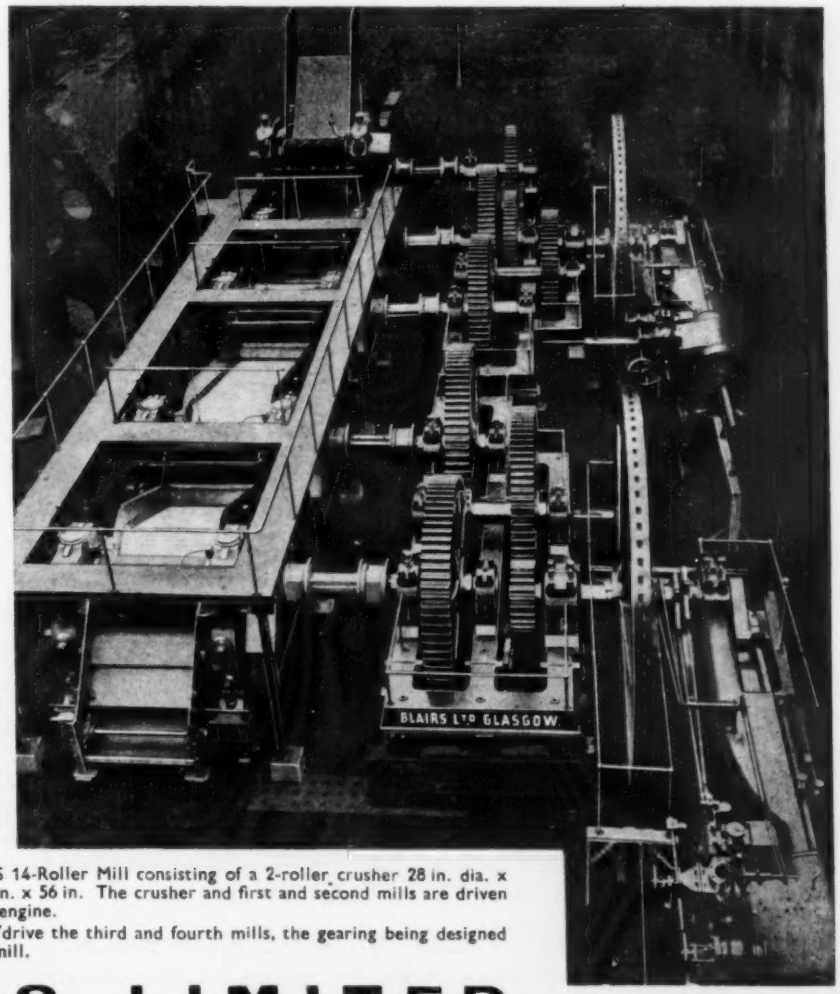
DISTILLERIES, ABSOLUTE ALCOHOL & CHEMICAL PLANTS

Sole Makers of

MULTIPLEX

FILM

EVAPORATORS



Our illustration shows a BLAIRS 14-Roller Mill consisting of a 2-roller crusher 28 in. dia. x 56 in. and four 3-roller mills 28 in. x 56 in. The crusher and first and second mills are driven by a 26 in. x 48 in. piston-valve engine.
A similar engine is provided to drive the third and fourth mills, the gearing being designed for extension by adding a fifth mill.

BLAIRS LIMITED

WOODVILLE STREET · GLASGOW, S.W.1

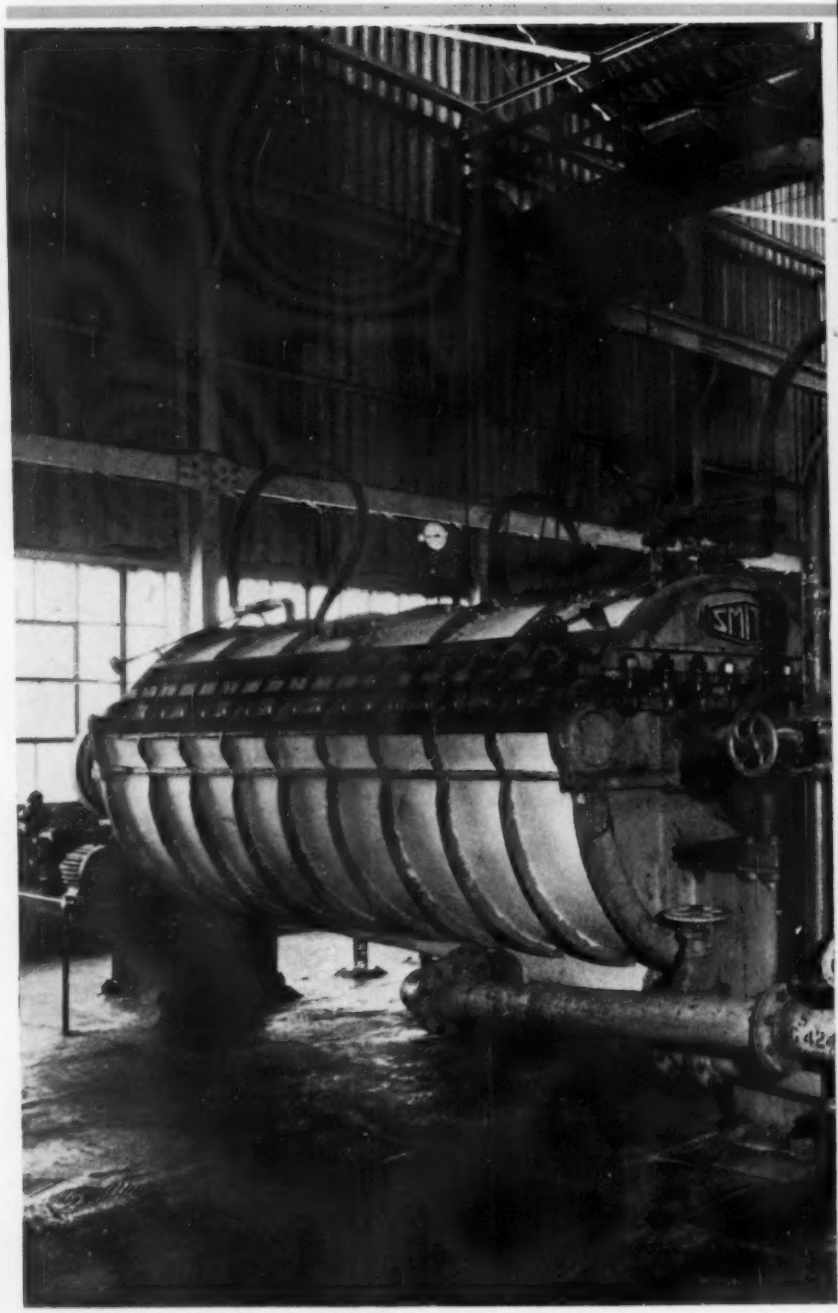
Cables : "BLAZON GLASGOW"

London Office : **38 Grosvenor Gardens, S.W.1** *Cables :* "Multivap Sowest London"

SMITH

SUGAR MACHINERY

Wishing All Readers
the Compliments of the Season
and Success in the New Year

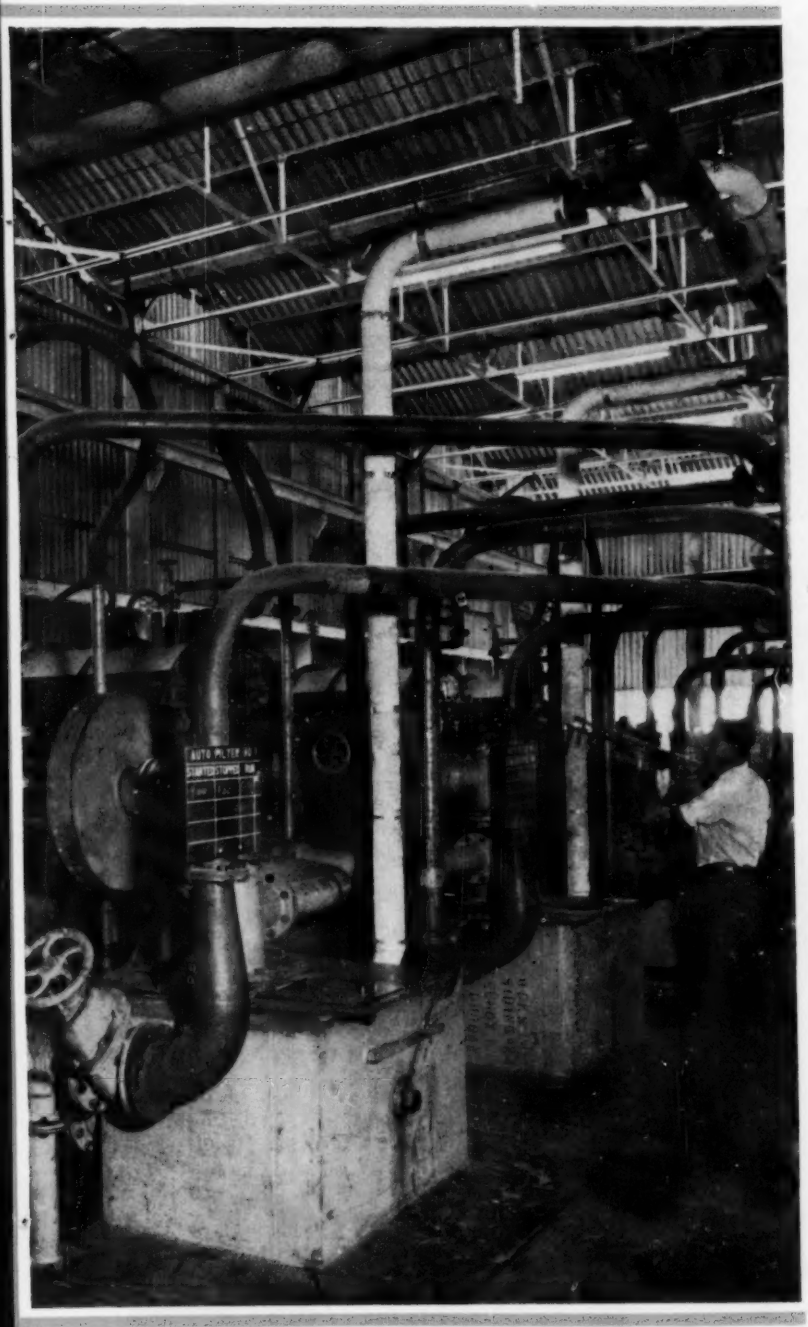


*SOUTH AFRICA

AUTO FILTER STATION AT GLEDHOW, NATAL, SOUTH AFRICA.

Four Filters each 1260 sq. ft. surface in the first modern process carbonatation system in Natal.

Continuous single carbonatation has now superseded the older batch system in many Refineries throughout the World.



A. & W.

SMITH

& CO. LTD.

SUGAR FACTORY & REFINERY ENGINEERS

21 MINCING LANE

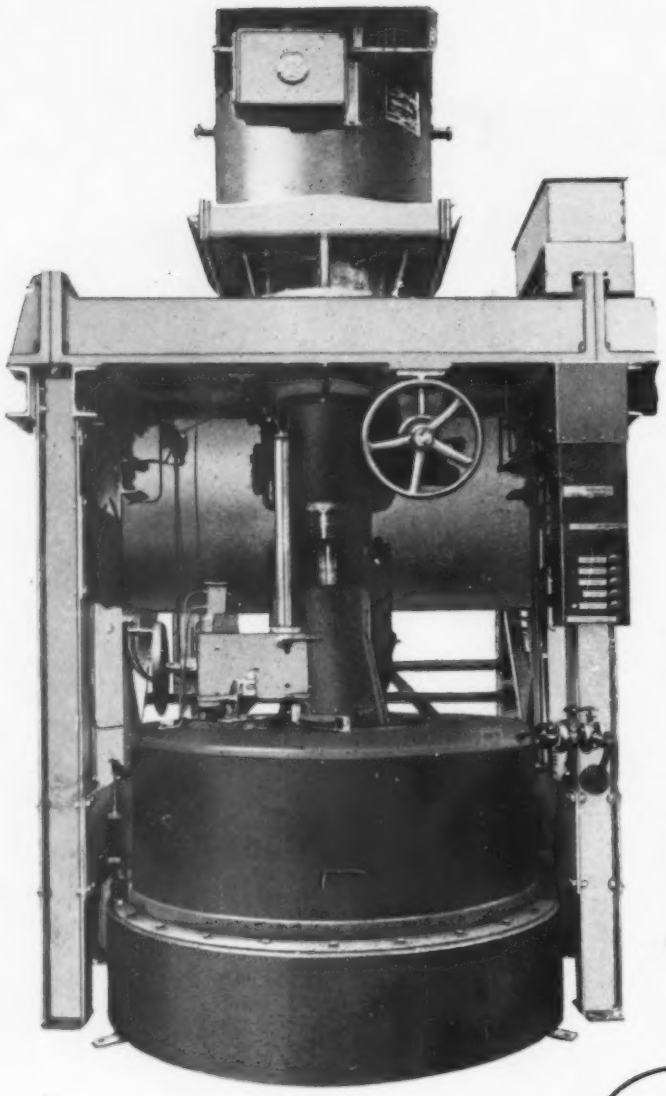
LONDON · E.C.3

Cable Address: "Sugrengine, London"

WORKS:

COOK STREET

GLASGOW C.5



P&W

ELECTRICALLY DRIVEN CENTRIFUGALS

with special operating advantages

- Semi-Automatic Operation
- Greater output at less cost
- Safe ploughing interlocks
- Regenerative Braking to plough speed
- Robust suspension head; large bearings; oil lubrication
- Basket capacity controllers

POTT, CASSELS & WILLIAMSON LTD.

MOTHERWELL - LANARKSHIRE - SCOTLAND

Cables : Pott, Motherwell

CARRUTHERS and his colleagues[6] found that, at a temperature of 133°C, the residual invert in % of the original sucrose was:

After	5	minutes	0·26%
,,	10	,,	0·65%
,,	15	,,	1·00%
,,	20	,,	1·30%
,,	25	,,	1·75%
,,	30	,,	2·00%

With a retention time of 5 minutes, therefore, the total loss on beets was 0·0416%. In another paper[7], the same authors give similar, rather lower, values. When sampling evaporator juices in 1957, RIEMER and GERSETIC[8] found similar values, although the juice was subjected in the first body to a temperature of 142°C. In other factories even higher temperatures —using superheated steam—are recorded without apparent harmful effects on the juices.

If desired, it is possible to calculate the retention time in each body or effect of the evaporator, using the formula $T = \frac{J.E}{e}$ where T is retention time in minutes, J is the juice volume in litres†, E is the evaporation in % of juice entering the body, and e the specific evaporation of the body, $= \frac{H.k.\Delta t.}{I''-i''}$ H = h.s. of body, k = heat transfer coefficient, Δt = temperature difference, $I''-i''$ = latent heat of evaporation. In the first effect, the retention time in the L.V. system will be shorter than in the normal system; in the last effect it will be a little longer. Table III shows the relation between inside diameter, heating surface and juice volume of tubes.

Table III.

Tube i.d. (mm)	20	24	28	32	36	40
Heating surface (sq.cm./m) ..	628	754	880	1005	1130	1256
Juice content (c.c./m)	314	452	615	804	1017	1256
H.S./juice ratio..	2:1	1·57:1	1·43:1	1·31:1	1·11:1	1:1

If the last effect is split into three vessels, the retention time in these should not influence colour or inversion to any great extent.

In Table IV the extent of incrustation in both systems is tentatively compared, assuming 200 mg/kg of non-sugars in thin juice liable to form scale to the extent of 10% in the first effect, 20% in the second, 30% in the third and 20% in the last effect, 20% remaining in the thick juice.

Table IV.

	——Normal system——			——L.V. System——		
Effect	Heating surface (sq.m.)	kg incrustation per hour	Scale thickness formed per 24 hr (μ)	Heating surface (sq.m.)	kg incrustation per hour	Scale thickness formed per 24 hr (μ)
I	1400	78	56	1200	78	65
II	2400	156	65	1400	156	112
III	1400	234	166	1800	234	130
IV	600	156	260	2400	156	65

A marked disadvantage for the L.V. system exists only in the 2nd effect where the retention time is much shorter; in the last stage, the retention time is longer but scaling is reduced by four-fifths. Such extreme incrustations will not occur frequently but for the purpose of comparison it is preferable to consider higher figures. Another point must be considered: for crystallization in general a certain supersaturation is necessary, and since all incrustations in evaporators are crystals, it is of interest to compare the ratio of water to (assumed) scale-forming material for the two systems (Table V).

Table V.

(Normal system given in Roman figures; L.V. system in *italics*)

	g/kg beets				
	Juice (1)	dry substance (2)	Water (3)	Scale-forming material (4)	Ratio of (3) to (4)
Thin juice	1300	169·00	1131	0·200	5655 : 1
	1300	*169·00*	*1131*	*0·200*	*5655 : 1*
1st middle juice ..	870	168·98	701·02	0·180	3894 : 1
	1040	*168·98*	*871·02*	*0·180*	*4838 : 1*
2nd middle juice	440	168·94	271·06	0·140	1935 : 1
	780	*168·94*	*611·06*	*0·140*	*4364 : 1*
3rd middle juice ..	340	168·88	171·12	0·080	2137 : 1
	520	*168·88*	*351·12*	*0·080*	*4387 : 1*
Thick juice	260	168·84	91·16	0·040	2279 : 1
	260	*168·84*	*91·16*	*0·040*	*2279 : 1*

Thus, under the same conditions, which are not easy to define, the ratio of water to scale-forming material is more favourable to the L.V. system in all effects except the first and last effects where the ratios are identical for both systems. Other losses of dry substance during evaporation are not taken into account in this table.

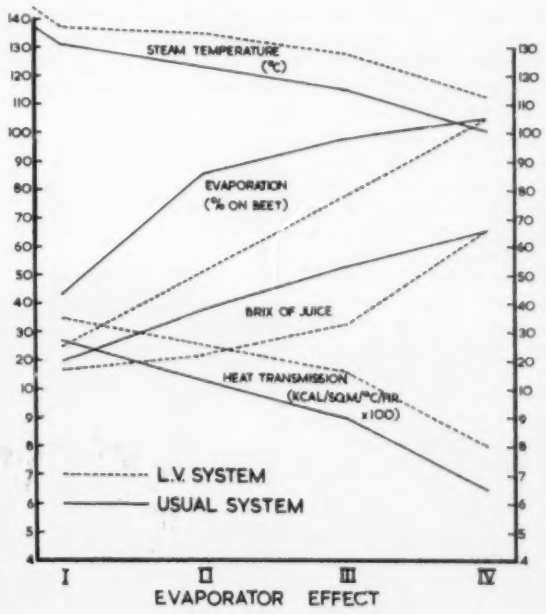


Fig. 5.

In Fig. 5 the usual system of evaporation is compared with the L.V. system. (*To be continued.*)

† In the table, only the tubes have been considered; for exact calculations the residual juice volume should be taken into account.

[7] *I.S.J.*, 1958, **60**, 24.

[8] *Chem. Lab. J.* (Bruck a.d. Leitha Sugar Factory, Austria), 1957.

LOVELAND SUGAR FACTORY, COLORADO

AT Loveland is the oldest and, in a practical sense. one of the newest factories of The Great Western Sugar Company. The Company owns eighteen beet-slicing factories: ten in Colorado. four in Nebraska, one in Wyoming, one in Montana and, through a subsidiary, Northern Ohio Sugar Company, two in Ohio. Also, at Johnstown, Colorado, are two uniquely integrated plants, one producing sugar from molasses by the so-called barium process, and the other producing monosodium glutamate, sulphate of potash and "LPC," described as a liquid protein concentrate for livestock feed. Great Western, with total assets of some $83,000,000, is the largest beet company in the United States. In 1958 its combined operations produced more than 550,000 short tons of sugar from about 224,000 acres in the western states and Ohio.

This large operation today stems from the construction of the Loveland factory in 1901, the first sugar factory in northern Colorado. This factory and five others were incorporated as The Great Western Sugar Company in 1905. Loveland's first campaign, beginning in the autumn of 1901, continued into February, 1902, at a slicing rate of about 1000 tons per day. In 1959 Loveland was slicing upward of 3000 tons per day. In 1958 the Loveland factory won the company's efficiency pennant for the fourth time. This annual competition between factories has been in effect since 1919. Also, in 1958, Loveland, for the first time in its history, produced more than a million 100-lb bags of sugar.

Why the oldest company mill can be called, in a sense, one of the newest, is attributable to its leading position in the company's post-war modernization programme. Many improvements had, of course, been made since the early years, but major changes began in 1948 with the installation of two high-pressure boilers, a continuous Silver battery, a 2500-kW turbine and a change of entire factory equipment from line-shaft drives to individual motor drives.

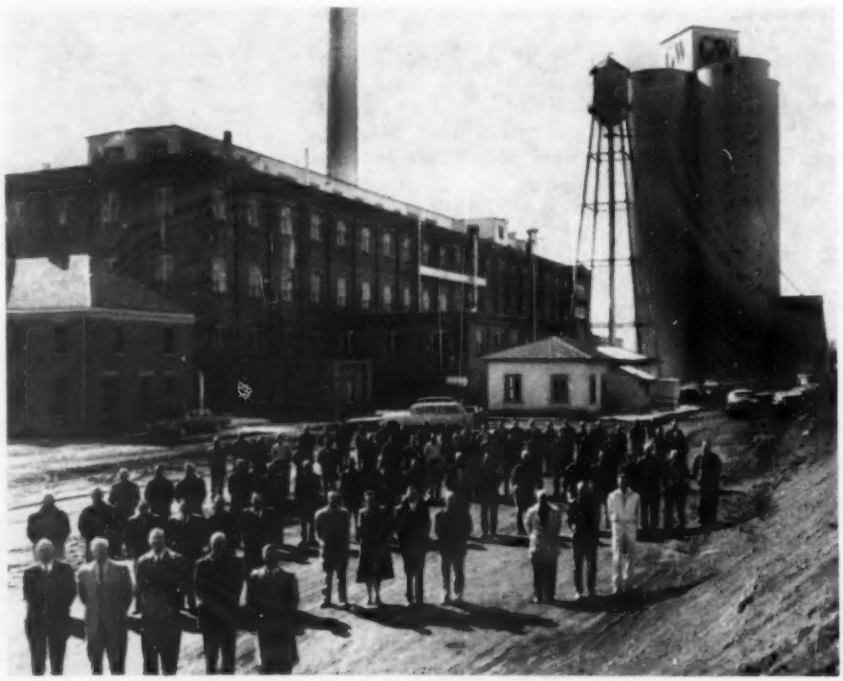
In 1949 new installations included high-pressure evaporators and ribbon-element vacuum pans to improve steam efficiency. In 1950 a huge pulp dryer to handle all pulp and pellet production was installed, and in 1957 four sugar bins, 197 feet high and capable of storing 32,000,000 pounds of sugar, were constructed. These are believed to be the highest sugar bins in the world (see frontispiece.)

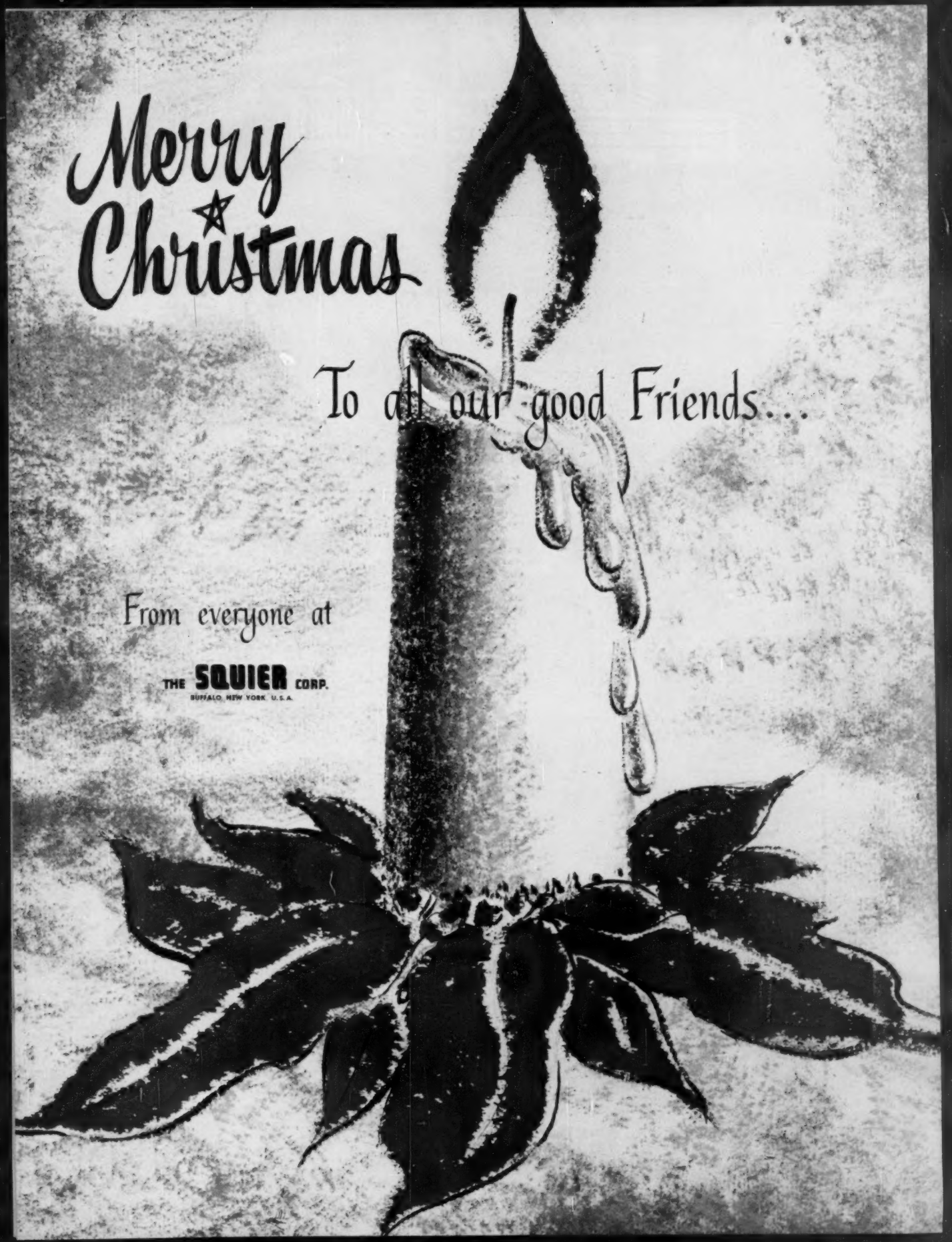
Meanwhile, Loveland had become the nerve centre of the company's technological research. The Process Development Laboratory at Loveland, started in 1950, had done the pilot work leading to construction of the monosodium glutamate at Johnstown in 1954 and continues research on various factory processes.

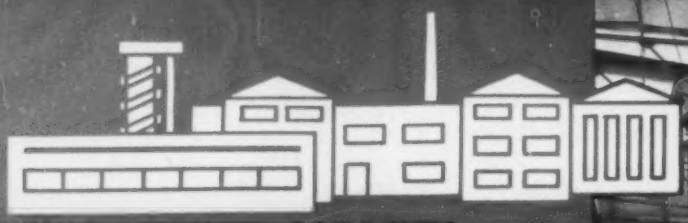
Loveland is also the headquarters of The Great Western Railway, a company subsidiary, serving six factory communities. Freight traffic consists largely of sugar beets, sugar and other agricultural products. This 63-mile railroad operates four steam and five diesel-electric locomotives and 303 freight cars.

The story of how the beet sugar industry came to Loveland is characteristic of the general development of the industry elsewhere in Colorado and the adjacent West. The Pike's Peak gold-rush of 1858-59 conveniently marks the beginning of the modern West. It brought thousands of people to a hitherto desolate area and almost immediately the pattern of Colorado as we now know it, with its towns, cities and farm lands, was established.

By the turn of the century the bonanza boom days of the mining period were over. The mountains had been looted. The West had been ravaged by money panics and business failures. Limitless cattle ranges




Merry Christmas
To all our good Friends...
From everyone at
THE SQUIER CORP.
BUFFALO, NEW YORK, U.S.A.

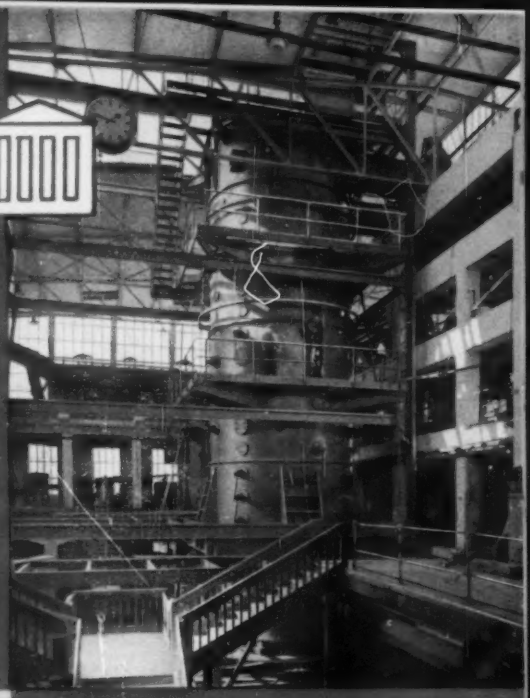


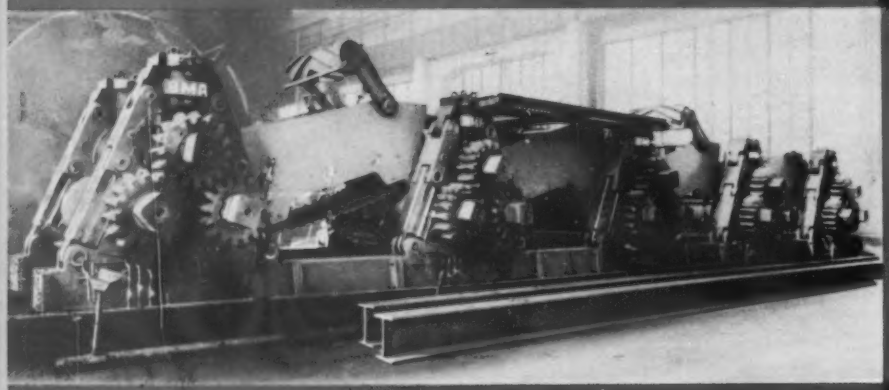
LESS PERSONNEL—HIGHER CAPACITY BETTER OPERATION RESULTS

thanks to our new processes and mechanical plant which have proved most satisfactory during recent campaigns.

We refer specially to :

- **BMA** continuous diffusion towers for beet (and experimentally for cane)
- **BMA** sugar cane mills with plain bearings or roller bearings and successful triangular construction with all-roller drive
- **BMA** fully automatic juice purification plants Prof. Schneider—BMA System
- **BMA** fully automatic centrifugals
- **BMA** continuous centrifugals





Please send us your enquiries we will be glad to advise you without obligation !

In addition, we supply all machinery and equipment required for the extraction of sugar.

During the last three years we have supplied *inter alia* :

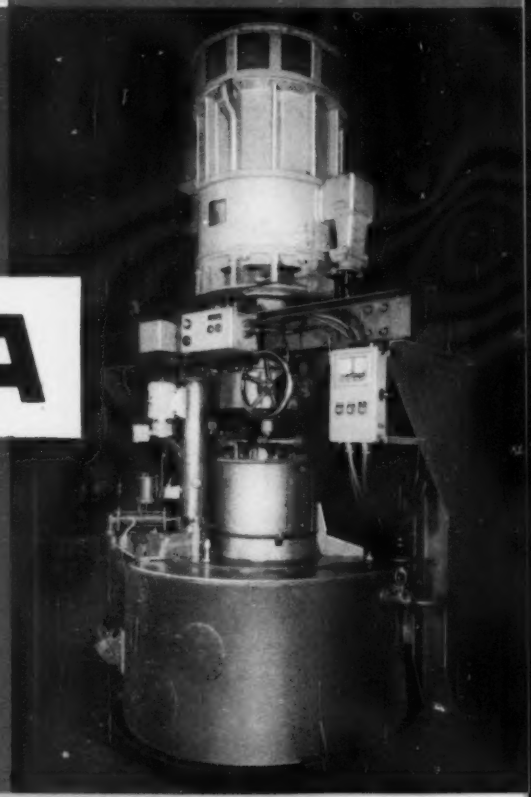
8 complete cane sugar factories for India,

3 complete beet sugar factories for Chile,

1 beet sugar factory for Turkey, and

1 beet sugar factory for Yugoslavia, as well as sugar refineries for Korea.

BMA



BRAUNSCHWEIGISCHE MASCHINENBAUANSTALT

BRAUNSCHWEIG / WESTERN GERMANY

For more than 100 years we have supplied complete factories for beet sugar and cane sugar as well as plants for alcohol, yeast, starch, tanning agents and edible oils.

BMA 121c

were disappearing ; the farmer and the barbed wire fence had come to stay.

But this was a high, dry country, with less than half the rainfall of the Mississippi Valley. Irrigation water, impounded from mountain snows and brought to the land by canals and ditches, was necessary for profitable yields. But bringing water to the land was costly. One irrigation project after another went bankrupt. Standard crops could not pay. Yields were low. Perishable crops could not reach distant markets. Farm land was choked with weeds.

Inbred plots, part of the beet breeding programme at Longmont, Colo., Experiment Station of Great Western Sugar Co.

By 1898 farmers in the Loveland area were trying to base solvent agriculture on grain, alfalfa and fruit crops, but prices were deplorably low. There were, of course, some flour mills, but not enough animals to consume the hay, and the fruit crops were hazardous. There now was developing a wide-spread interest in sugar beets, but it was recognised that in order to grow sugar beets, farmers must have access to sugar factories.

This yearning for sugar factories had been manifest for years. Of historical interest was the prophecy of a "fifty-niner" Swedish immigrant, PETER MAGNES: "If we had beet sugar factories in Colorado similar to the flour mills scattered around, so that farmers could raise beets and draw them to the mill and get them manufactured the same as we now get grain manufactured into flour and meal, I imagine Colorado farmers would produce more gold than all the miners in the mountains."

How this prophecy was more than fulfilled was cited by Great Western with Colorado's centennial celebration in 1958-59. Colorado's total gold production for 100 years beginning with the Pikes Peak gold rush of 1858-59 was $905,956,200, while the value of beet sugar produced by Colorado factories of Great Western in 58 years, beginning in 1901, was $1,551,480,000. This figure did not include the value of any by-products such as beet pulp, molasses or monosodium glutamate.

What happened, of course, with the introduction of the beet at the turn of the century at Loveland and other northern Colorado communities, was an ideal integration of agriculture, animal husbandry and industry, thanks to investors who built the factories. Among those who put up the money were several who had done well during the mining boom days.

It was soon apparent that the beet was producing fully twice as much food per acre as other crops then being grown. The clean cultivation required by the beet cleaned up foul fields for crops grown in sequence with the beet. Wild oats, in particular, had become a most serious problem.

Mechanical thinning of sugar beets using tandem cutting heads developed by Great Western engineers.

Yields of other crops now improved and, through availability of beet pulp, molasses and beet tops, a large livestock-feeding industry developed. Through the animal, hay and grain, hitherto of low value locally, could now be marketed profitably. Northern Colorado was soon to winter-fatten more lambs than any other area in the United States.

The beet became the basis of farm financing and was looked upon as a "mortgage lifter". It proved to be the most dependable crop that could be grown extensively on western irrigation projects. Reclamation records, over the years, have repeatedly confirmed this fact. Moreover, following introduction of the beet, concentrated sugar and meat could be shipped to distant markets hitherto inaccessible, economically, to bulky and perishable western crops.

The Great Western Sugar Company is a vital institution in the economy of the West. All of its thirteen directors live in Colorado. Frank A. Kemp, a typical Westerner, has been President since 1936. His activities have covered a broad domestic and international field.

Under his leadership, substantial gains have been made in Great Western operations. He often cites the history of the beet-growing areas in reply to any who charge that western resources have been wasted or soils abused. Record acre yields are being produced from 30 per cent less land than was used a quarter century ago. Moreover, the same areas are producing upward of 5 tons more per acre than half a century ago.

While only about a fifth of the land is in beets in company areas, beets are the most important crop, the hub around which the operation of the entire farm is planned.

Through the company's experiment station at Longmont, Colorado—the largest in the industry—progressive achievements are being made in improving the beet itself. This research aims at more sugar per acre, control of disease and developing beets favouring highest sugar extraction.

Recently, Great Western has incorporated polyploidy investigations into its beet-improvement breeding programme, working jointly, through contract agreements, with Bush Johnsons, Ltd., of Maldon, Essex, and the D. J. van der Have Company of Kapelle-Biezelinge, Netherlands.

Copyright reserved by the author.

THE FATE OF SOME OF THE PRINCIPAL AMINO-ACIDS OF CANE JUICE DURING MOLASSES FORMATION

I. Preliminary Tracer Studies with certain Carbon-14 Labelled Amino-Acids

By W. W. BINKLEY

(New York Sugar Trade Laboratory, 37 Warren Street, New York 7, N.Y., U.S.A.)

AMINO-ACIDS play significant dual rôles in the production of sugar from sugar cane. While they are essential to the vitality of the plant and the formation of sucrose, this group of compounds subsequently participates during factory operations in the formation of substances which act as one of the principal deterrents to complete sugar recovery. This group of melassigenic polymers is known as melanoidins. There is available in cane juice for these polymerizations an impressive variety of amino-acids; their identification[1,2] and quantitative estimation[3] in certain instances have been achieved by chromatographic methods.

Chromatography is a proven tool for carbohydrate research also[4,5]. The potentialities of the co-ordinated uses of chromatographic and radioactive tracer techniques appear to be virtually unlimited. Some fruitful results have been obtained already from their use in the investigation of melanoidin formation[6]. We have employed these techniques in the continuation of our researches on the production of molasses-like polymeric substances from cane juice with added radioactive compounds. We wish to report herein some of our findings in this work using certain carbon-14 labelled amino-acids.

Experimental

The cane juice used in this work was reconstituted from lyophilized whole mixed raw juice. The analysis of the lyophilized cane juice solids has been published[7].

The final molasses was a product of the Southdown sugar factory, Houma, Louisiana, U.S.A.; its analysis has appeared previously[7]. The clarified diluted molasses (Brix approximately 12°) was used as a colour standard in the estimation of the heating period required to produce a comparable colour in the model experiments.

Colour Formation at 95–97°C in Limed Cane Juice with Added Radioactive Amino-Acids

Eighteen grams of lyophilized cane juice solids were dissolved in sufficient distilled water to produce

[1] Pratt and Wiggins: *Proc. B.W.I. Sugar Tech.*, 1949, 29; *I.S.J.*, 1951, **53**, 112; Wiggins and Williams: *Proc. B.W.I. Sugar Tech.*, 1951, 40; *I.S.J.*, 1953, **55**, 22.
[2] Kowkabany *et al.*: *J. Agric. Food Chem.*, 1953, **1**, 84.
[3] Roberts and Martin: *Sugar*, 1956, **51**, (1), 32; *I.S.J.*, 1956, **58**, 316.
[4] Kowkabany: *Advances in Carbohydrate Chem.*, 1954, **9**, 304.
[5] Binkley: *Advances in Carbohydrate Chem.*, 1955, **10**, 55.
[6] Chichester *et al.*: *J. Amer. Chem. Soc.*, 1952, **74**, 3418.
[7] *I.S.J.*, 1959, **61**, 173.

W. NURNBERG

Another newcomer is instructed in the Stewart tradition

DUNCAN STEWART & COMPANY LIMITED, Park Gate, Glasgow

W.N./3

Suchar

ACTIVATED CARBON

CUTS CARBON COSTS 10% or MORE!

On the basis of cost *per pound of refined sugar produced*, over and over again SUCHAR proves itself the most economical carbon available.

You use less SUCHAR than you would other carbon. Buy less, handle less, store less, too.

We will be happy to quote on your requirements.

SUCHAR SALES CORPORATION

CONSULTING ENGINEERS

76 Beaver Street
New York 5, N. Y.

Cable Address: "SUCHARING" N.Y.

EXCLUSIVE DISTRIBUTORS OF SUCHAR ACTIVATED CARBON AND FAS-FLO FILTERS FOR THE CANE SUGAR INDUSTRY

SUCHAR
FOR CANE

150 g of solution. Optically-clear limed juice was obtained as described already[7]. The radioactive amino-acids used were glycine-2-C-14, DL-α-alanine 1-C-14 and DL-aspartic-4-C-14 acid (New England Nuclear Corp., Boston, Mass., U.S.A.). An amount of one of these possessing 33 to 48 microcuries of radioactivity was added to the clarified, limed juice just prior to the start of the heating at 95–97°C. The juice, mechanically stirred, was heated at 95–97°C in a flask equipped with a reflux condenser. Aliquots (about 10 ml each) were removed from the reaction mixture after 7, 24, 31 and 48 hr. The colour (Fig. 1)

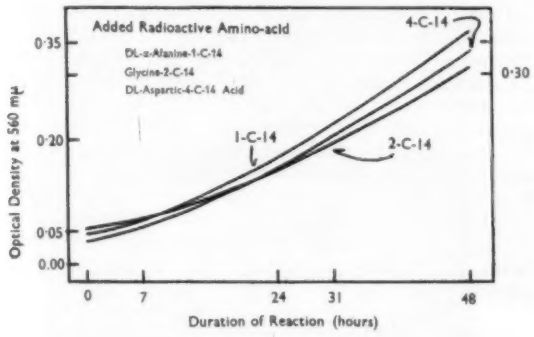


Fig. I.

and pH at 20°C of these were determined. The pH changed from 7·35–7·45 to 5·05–5·10 during the 48 hr heating period. The aliquots were de-watered partially by lyophilization. Final drying was achieved at 25°C under vacuum with phosphoric anhydride. The radioactivity of these products was measured by the New England Nuclear Assay Corp.; these results are shown in Table I.

Table I.

Radioassays of the Non-Volatile Solids from the Action of Heat at 95–97°C on Cane Juice with Added Carbon-14 Labelled Amino-Acids.

Duration of Heating, hr	Added Carbon-14 Labelled Amino-Acids		
	DL-α-Alanine-1-C-14, μc/g	Glycine-2-C-14, μc/g	DL-Aspartic-4-C-14 Acid, μc/g
0	2·08	1·78	1·38
7	2·13	1·75	1·24
24	1·93	1·81	1·23
31	1·80	1·82	1·40
48	1·85	1·85	1·25

Isolation of the Radioactive "Browning" Polymers

Each of the preceding reactions containing an added radioactive amino-acid was allowed to proceed for a total of 72 hr at 95–97°C. A 35 ml portion of each of these was adjusted with distilled water to a volume of 100 ml. The three diluted reaction mixtures were dialysed separately in a cellulosic membrane bag (22 in long, 2·25 in dia., 0·0023 in wall thickness) for 96 hr against deionized water in apparatus which permitted the complete change every 2 hr of the solution outside the membrane bag. The polymer solutions were dewatered and the isolated polymers were dried in the same way as that described already for the reaction mixtures during polymer formation. The radioactivities (μc/g) of the 72 hr reaction mixture solids and the isolated "browning" polymers, respectively, were as follows: with added glycine-2-C-14, 1·77, 24·1; DL-α-alanine-1-C-14, 1·82, 4·50; DL-aspartic-4-C-14 acid, 0·95, 1·44 (radioassays by the New England Nuclear Assay Corp.); other pertinent data are collected in Table II.

Table II.

Radioactivities of the Non-Volatile Solids from the Action of Heat at 95–97°C for 72 hours on Cane Juice with Added Carbon-14 Labelled Amino-Acids and of the Respective Isolated "Browning" Polymers.

Added Carbon-14 Labelled Amino-Acid	72-hr Reaction Mixture		"Browning" Polymer		Carbon-14 Labelled Amino-Acid Bound in Polymer, %
	g*	μc†	mg‡	μc†	
DL-α-Alanine-1-C-14	5·04	9·17	81	0·37	4·0
Glycine-2-C-14	5·04	8·92	78	1·88	21·1
DL-Aspartic-4-C-14 Acid	5·08	4·83	78	0·11	2·3

*Amount dialysed. † Total activity. ‡ Retained by membrane.

Radioautogram of the Paper Chromatogram of the Starting and 72-hr Reaction Mixtures

Three to five additions from the respective starting and 72-hr reaction mixtures containing added radioactive amino-acids were made at designated positions on a 15 × 18 cm sheet of Whatman No. 1 filter paper. The paper chromatogram was developed at 25°C with 1-butanol : ethanol : water (2:2:1 v/v/v) and was dried in air at 25°C. It was developed four additional times. The paper chromatogram was then allowed to remain in contact with Type KK x-ray film (Eastman Kodak Co., Rochester, New York, U.S.A.) for 7 days. The film was developed and dried. The radioautogram is depicted in Fig. 2.

Results and Discussion

The merits of using lyophilized cane juice in this type of research were presented previously[7]. The optical characteristics of the colour bodies formed in the heated limed reconstituted juice were virtually the same as those of cane final molasses. The rate of colour production in the limed juice was not altered by the addition of certain radioactive amino-acids (Fig. 1).

Three cane juice amino-acids were selected for these tracer studies, namely glycine, alanine and aspartic acid labelled with carbon 14. Glycine was

$C^*H_2NH_2–COOH$ — Glycine-2-C-14

$CH_3–CHNH_2–C^*OOH$ — DL-α-Alanine-1-C-14

$HOOC^*–CH_2–CHNH_2–COOH$ — DL-Aspartic-4-C-14 Acid

$C^* = C\text{–}14$

chosen because it is the simplest member of the amino-acid series and when tagged at Carbon 2 could polymerize without loss of radioactivity due to decarboxylation. Alanine is the most abundant

monocarboxylic amino-acid in Louisiana cane juice[8]; the behaviour of the 1-C-14 modification would be expected to offer some indication of the significance of decarboxylation during molasses formation. DL-Aspartic-4-C-14 acid was used to represent the dicarboxylic amino-acids instead of asparagine because of the unavailability of the latter in radioactive form. Limed cane juice with added glycine-2-C-14 displayed no loss in radioactivity at 95–97°C during the 48 hr period of the formation of molasses-like polymers (Table I). Substantially the same quantitative behaviour for glycine-2-C-14 was noted in the preparation of a glycine-D-glucose melanoidin under markedly different conditions[8]. Juices with added DL-α-alanine-1-C-14 and with added DL-aspartic-4-C-14 acid underwent some apparent loss in radioactivity, perhaps as much as 10% during the 48 hr reaction period (Table I). Although the loss of carbon-14 dioxide has been observed in the preparation of radioactive melanoidins under diverse conditions[9], the magnitude of the change in radioactivity in our experiments was too small to indicate a major reaction pattern. The nature of this change will be a subject of further study.

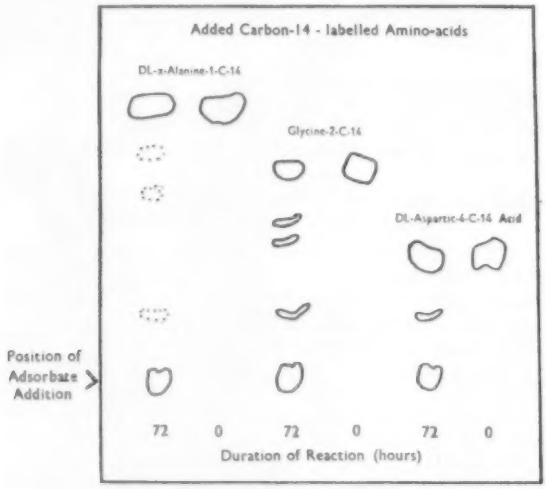


Fig. II.

The duration of the heating at 95–97°C of the cane juice with added carbon-14 amino-acids was extended to 72 hr to permit the formation of additional polymer. A paper chromatogram including these juices before and after the heating period was prepared; the radioautogram of this chromatogram is shown in Fig. 2. The most complex polymeric substances remained at the point of adsorbate addition. The polymers formed in the presence of glycine-2-C-14 possessed, as expected, the greatest radioactivity. The activities of the polymers formed in the presence of the other tagged amino-acids were markedly less; most of the added labelled reactants appeared to be unused. The polymers formed in the presence of DL-α-alanine-1-C-14 were perceptibly more active than those produced in an environment of DL-aspartic-4-C-14 acid. These observations were verified by radioassays of the respective isolated polymers. Distinct radioactive polymeric intermediate substances with identical low mobilities were noted near the position of adsorbate addition on the paper chromatogram. They appeared as buff-coloured spots. Other less distinct areas of greater mobility were observed on the radioautogram and these appeared to represent simpler radioactive reaction products.

SUMMARY

Heated limed cane juice with added carbon-14 amino-acids produced radioactive molasses-like "browning" polymers. Juice admixed with glycine-2-C-14 underwent no change in activity throughout the 48 hr period of heating at 95–97°C. Reaction mixtures containing amino-acids with carbon-14 in the carboxyl group, DL-α-alanine-1-C-14 and DL-aspartic-4-C-14 acid, sustained some loss in activity. Radioactive polymeric intermediate substances with identical low mobilities were observed in a radioautogram of the paper chromatogram of the heated juices containing separately the added labelled amino-acids.

ACKNOWLEDGMENT

The writer wishes to thank Dr. L. F. MARTIN, Head, Sugarcane Investigations, United States Department of Agriculture, for the lyophilized cane juice used in this work and to acknowledge the consultation of Mr. ALAN CHANEY of the Ohio State University in the preparation of the manuscript.

New Sugar Mill for Haiti.[10]—The U.S. State Dept. has announced a $3 million loan to be made to Centrale Sucrière Nord-Haiti S.A. of Cap Haitien, Haiti, to help build a sugar mill.

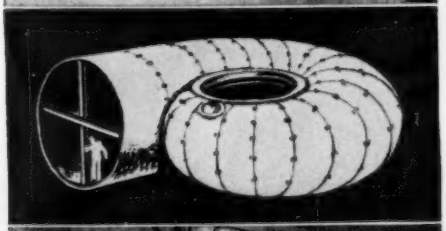
* * *

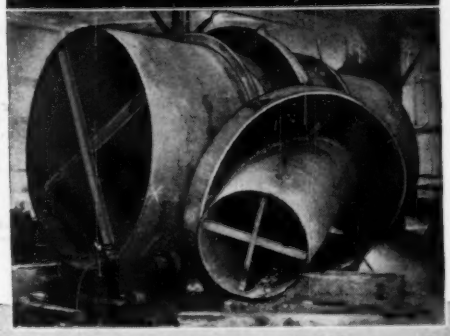
Indian Imports of Sugar Machinery to Cease.[11]—Because of the shortage of foreign exchange the Indian Government has decided not to allow imports of complete sugar factory machinery in future. It has, however, permitted six Indian firms to produce sugar machinery in cooperation with foreign suppliers, and this is expected to reduce the demand for foreign currency from Rs. 8 million to Rs. 2 million per plant. Since the beginning of 1958 29 new sugar factories have started working in India, and a further 7 are to be put into operation by March 1960.

* * *

Sugar School in the Dominican Republic.—A School of Sugar Technology is to be established at the University of Santo Domingo, Dominican Republic. It is designed to fill the need for trained personnel to carry out an increasing volume of research in the Republic's sugar industry. The first part of the three-year course commences this autumn and will be taken by twenty graduates in Natural Sciences. Subjects studied will include sugar manufacture and by-products, sugar cane and soil analysis, sugar machinery and a practical period in the final year when each student will be attached to a sugar mill for a complete season. The school will be under the direction of Dr. LUIS VELAZQUEZ DÍAZ.

[8] WOLFROM *et al.*: *J. Amer. Chem. Soc.*, 1953, **75**, 1013.
[9] STADTMAN *et al.*: *J. Amer. Chem. Soc.*, 1952, **74**, 3194.
[10] *Public Ledger*, 26th September 1959.
[11] F. O. LICHT, *International Sugar Report*, 1959, **91**, (Supp.18), 245.





PIPES

Thousands upon thousands of miles of pipes—
mild steel pipes, straights, bends, branch pipes,
hydro-electric pipes, circulating water and
irrigation pipes, gas mains. Pipes for the
Blue Nile Dam and for Calder Hall,
for a power house in Mexico and a tin mining
plant in Nigeria—so the story goes on.
This is just part of the contribution
towards progress made by one of Britain's
most progressive engineering organisations.

The **HORSELEY** *Group*

HORSELEY BRIDGE &
THOMAS PIGGOTT LTD., Tipton, Staffs.

CARTER HORSELEY (ENGINEERS) LTD.
Tipton, Waddon, Sheffield, Newcastle
and Liverpool.

MECHANS LTD., Glasgow, W. 4.

150 BAGS OF GRANULATED SUGAR *packed per minute!*

with the TITESEAL *packaging machine*

The "TITESEAL" is the most advanced granulated sugar packaging machine in the world and incorporates the following features :—

Packaging speed adjustable between 100 and 150 bags per minute.

Both 1-lb and 2-lb or 0.5 Kilo and 1.0 Kilo can be packed on one machine.

All working parts are above the sugar line thus avoiding any damage to the mechanism from spillage and burst bags.

Mechanism fully protected with automatic cut-out switches wired to a central panel to show immediately the point of stoppage.

The two bag filling mechanisms work independently and either can be shut down for maintenance and the machine run at half speed.

Weighing machines guaranteed to an accuracy of plus and minus 1 gram.

Operates with pre-made block bottom, gusseted, S.O.S. bags, giving a square, well-finished pack with sift-proof seal.

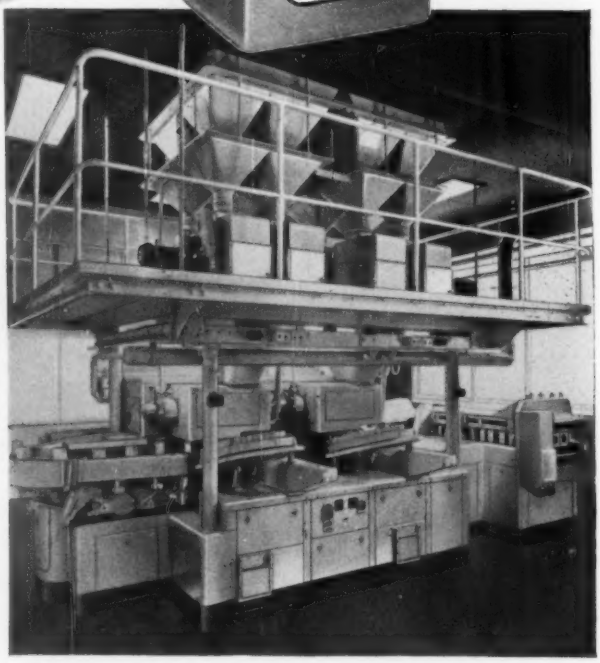
Fitted with centralised lubrication system.

Sealed packs delivered in lines of four for ease of parcelling.

All parts manufactured from precision tools and jigs.

The "TITESEAL" machine only requires one operator whose duties are to keep the bag magazines filled and generally to supervise.

Covered by a comprehensive guarantee for 12 months.



For refineries requiring a smaller capacity machine we manufacture the "SEALTITE" machine which will pack from 1-lb to 2-Kilo weights at speeds up to 50 packs per minute in S.O.S. bags with the same weighing accuracy as the Titeseal.

Full details of either machine will gladly be sent upon request.

Manufacturers

BRECKNELL, DOLMAN & ROGERS, LTD.

PENNYWELL ROAD · BRISTOL · ENGLAND

TELEPHONE: BRISTOL 58222 TELEGRAMS: 'BREMANERS' BRISTOL

Fibre Properties as Related to Milling Quality of Cane. *Tech. Rpt.* (Sugar Research Inst., Queensland), 1958, (47).—An attempt has been made to relate the tensile strength of fibrovascular bundles of different varieties of cane to their milling qualities. It was found that the proportion of insoluble material constituting the cell-wall of the juice cells was virtually constant for all varieties—about 4·5% on cane. Therefore (total fibre—4·5) represents the relative amounts of fibrovascular tissues in the pith section, nodal section and rind. There was a marked difference between the tensile strength of the individual fibres dissected from the pith; Badila gave an estimate of 2·0 tons per square inch, Q.50 2·9 tons and Pindar 3·3 tons. This is in keeping with the known milling qualities of three varieties, and it was concluded that the higher the strength of the fibre, the better is the cane from the milling viewpoint. The rind thickness and strength is one aspect of this characteristic which will be subjected to further study.

* * *

Assessing the Degree of Cane Preparation. *Tech. Rpt.* (Sugar Research Inst., Queensland), 1958, (48).—Tests have shown that the measurement of bulk density of prepared cane, when submitted to a prescribed pressure for a selected time, gives consistent and repeatable values for each type of preparation. It is preferable in this respect to sieve analysis. It was found also that there was a significant, almost linear, correlation between juice extraction and bulk density of feed. The method provides a simple, rapid and practical means of comparing degrees of cane preparation.

* * *

Two Rollers *vs.* Three Rollers. *Tech. Rept.* (Sugar Research Inst., Queensland), 1958, (50).—With similar feed work openings for two and three roll mills, then for equal roller speeds and identical feeding arrangements the ultimate crushing rates will be equal. Under these conditions, the extraction of the two-roll mill must always be lower than that of the three-roll mill for any work ratio higher than unity. Extraction in a two-roll mill can only be increased by reducing the work opening, which reduces ultimate crushing rate. To counteract this, roll speed must be increased appreciably; and although the two-roll mill might then equal the performance of a three-roll unit, there will be an increase in power requirements. This has been confirmed by examining the performance of a commercial two-roll crusher treating shredded cane at Pleystowe. Two-roll mills with normal diameters cannot be advocated in the light of this; but if roll diameter could be increased, it might be possible to design a unit equal in performance to a normal three-roll unit. But as there would require to be 45 in in diameter, they would be almost twice as heavy as normal rolls, and the mill cheeks would be correspondingly larger and heavier, and it is doubtful whether first costs would be much different from that of a three-roll mill.

* * *

The Viscosity of Final Molasses. *Tech. Rpt.* (Sugar Research Inst., Queensland), 1958, (51).—As the viscosity of final molasses is the major factor limiting practical exhaustion, studies were made to determine the effect of heat treatment and dilution prior to centrifugalling, and the removal of suspended and dissolved impurities on viscosity. The viscosity at saturation when plotted against temperature sometimes shows a sharp drop to a minimum above 60°C and then rises, while at other concentrations the curves are flat after 70°C. This is related to the variation of solubility coefficient with temperature. On the whole, it appears that reheating is preferable to dilution as an economic means of reducing viscosity. Removal of suspended solids (sludge) from final molasses significantly reduces viscosity and may nearly halve the original value. This suggests that substantial benefits may accrue if the sludge were removed from B molasses. Working with a solution of sucrose—glucose—fructose, the influence of various inorganic salts on viscosity have been studied. The order of decreasing influence of cations was Na, Mg, Ca, K and NH_4; and for anions was phosphate, aconitate, sulphate and chloride. Calcium and magnesium sulphates and chlorides, which have strong affinity for water, decrease the solubility of sucrose appreciably, while other salts have the opposite affect. Precipitation of impurities from molasses by fractional addition of ethyl alcohol gives sharp reduction in molasses viscosity. Substances removed were partly polysaccharide, partly nitrogenous, and partly sulphates and aconitates of potassium and calcium.

* * *

Use of Polyelectrolytes in Cane Juice Clarification. J. DUPONT DE RIVALTZ de ST. ANTOINE and F. LE GUEN. *Mauritius Sugar Ind. Resaerch Inst. Ann. Rpt.*, 1958, 96–100.—Addition of 1 and 2 p.p.m. of "Krilium" to juices at two factories gave no improvement in clarification while at a third factory a greater improvement was found with 25 p.p.m. P_2O_5 than with 1 p.p.m. of "Krilium", the latter also resulting in processing difficulties at the pan and centrifugal stations. It is concluded that addition at 1–2 p.p.m. was not beneficial and, while there might be substantial improvement when using 10–15 p.p.m., as reported in the literature, the cost involved would be prohibitive except in cases of extreme difficulty in clarification.

Massecuite and Molasses Relationships. F. GARCÍA LÓPEZ and J. A. CLARK. *Sugar J.*, (La.) 1959, **22,** (12), 15–18.—A graph is presented in which are represented the relationships between dry solids concentration and true purities of molasses and massecuites, and the impurities:water ratio and supersaturation coefficient of molasses. Examples of problems are worked out using the graph and the significance of the relationships briefly discussed. An appendix gives examples of the calculations made in order to draw the graphs.

* * *

The Problem of Excessive Trash at Glenwood Factory. L. SUÁREZ. *Sugar J.* (La.), 1959, **22,** (12), 30.—To cope with excessive trash falling to the mill bed, amounting to over 15%, the depth of the cross grooves of the front rolls were altered from $\frac{7}{8}$ to $\frac{3}{4}$ of the total depth of the tooth, and the intermediate carriers were brought as near as possible to the front rolls. Scraper blades, carefully constructed to avoid excessive wear of the blades and grooves, were used for cleaning the Messchaert grooves; no difference in extraction or moisture was found, but the amount of trash was reduced and crushing rate increased accordingly with almost the same mill speed and settings as previously.

* * *

Reducing Entrainment Losses in Evaporators. ANON. *Sugar J.* (La.), 1959, **22,** (12), 31.—The evaporator station was a bottleneck at one factory; capacity has been raised to 3900 tons by installing Centrifix International Corporation centrifugal-action entrainment separators[1].

* * *

Some Notes on the Setting and Operation of Mills. A. VAN HENGEL and K. DOUWES DEKKER. *Proc. 32nd Congr. S. African Sugar Tech. Assoc.*, 1958, 57–67.—An appreciation is given of the usefulness and drawbacks of the HUGOT formula[2] relating the variables involved in the function of a set of rollers. The formula attributed to Helmers (or Helders) is also considered; it gives results almost identical with those obtained using the Hugot formula and is similarly suspect because of factors which have not been considered. A formula, based on empirical measurements made in Java, is proposed, viz. $K = \frac{167Cf}{nDLF}$, where K is the radial opening between the rollers concerned (inches), C is t.c.h., f is fibre fraction on cane, n is speed of the top roller (r.p.m.), D is roller diameter (inches), L is roller length (inches) and F is the fibre fraction of the discharged bagasse. The factor 167 is suited to Java conditions but may have to be modified to suit Natal.

* * *

Automatic Cane Carriers. J. R. GUNN. *Proc. 32nd Congr. S. African Sugar Tech. Assoc.*, 1958, 68–71—Two types of automatic cane carriers are described. The first, operating on a 38 × 84 inch tandem, is driven by a steam engine which is fed by a large and small feed valve. These valves are solenoid-operated and allow the carrier to "creep" or to run at full speed, depending on three variables: the feed to the crusher (sensed by a hanging arm in the crusher chute), and the loads on an electrically driven knife set (detected by a current transformer) and a steam engine-driven set (detected by means of a small shaft-mounted electric generator.) In the second case, drive is via a magnetic slip coupling, the output shaft speed being altered as a function of the loading of two sets of cane knives, overloading of either reducing the carrier speed, and also of the position of a flap plate in the crusher chute which detects the feed, reducing the carrier speed if the feed is too high and the crusher chute flooded with cane.

* * *

Automation in the Sugar Industry. R. HARDY. *Proc. 32nd Congr. S. African Sugar Tech. Assoc.*, 1958, 72–78.—An account is given of a controller for pan vacuum to be installed in Rossburgh refinery. A differential pressure is measured between a constant water level and the level of water in a manometer connected to the pan. This differential is maintained at a constant value by adjustment of the position of a levelling vessel at the other end of the manometer by means of a motorized differential pulley. A description is also given of the Rotameter method of obtaining constant density milk of lime, reprinting an article which appeared in this Journal[3].

* * *

Automatic Weighing Systems for Maceration Water and Mixed Juice. J. C. CHOU. *Taiwan Sugar*, 1959, **6,** (2) 13–17.—Modifications to a Foxboro juice weigher included the fitting of a quick-acting air-actuated sluice valve to each juice inlet; delivery of juice to the tank through a perforated circular 4-inch pipe; gun-metal discharge valves connected in open-close relationship with the sluice valves; a sight glass below each discharge valve to detect leaks; and frequent injection of clean cold condensate to clean the air-bubble tube. An automatic weigher for maceration water is described and illustrated; it is in the form of a single tank-unit with float-actuated feed and discharge valves which are linked so that the water fills the tank to the requisite level (corresponding to one metric ton) and then discharges to a receiving tank from which it is pumped to the tandem.

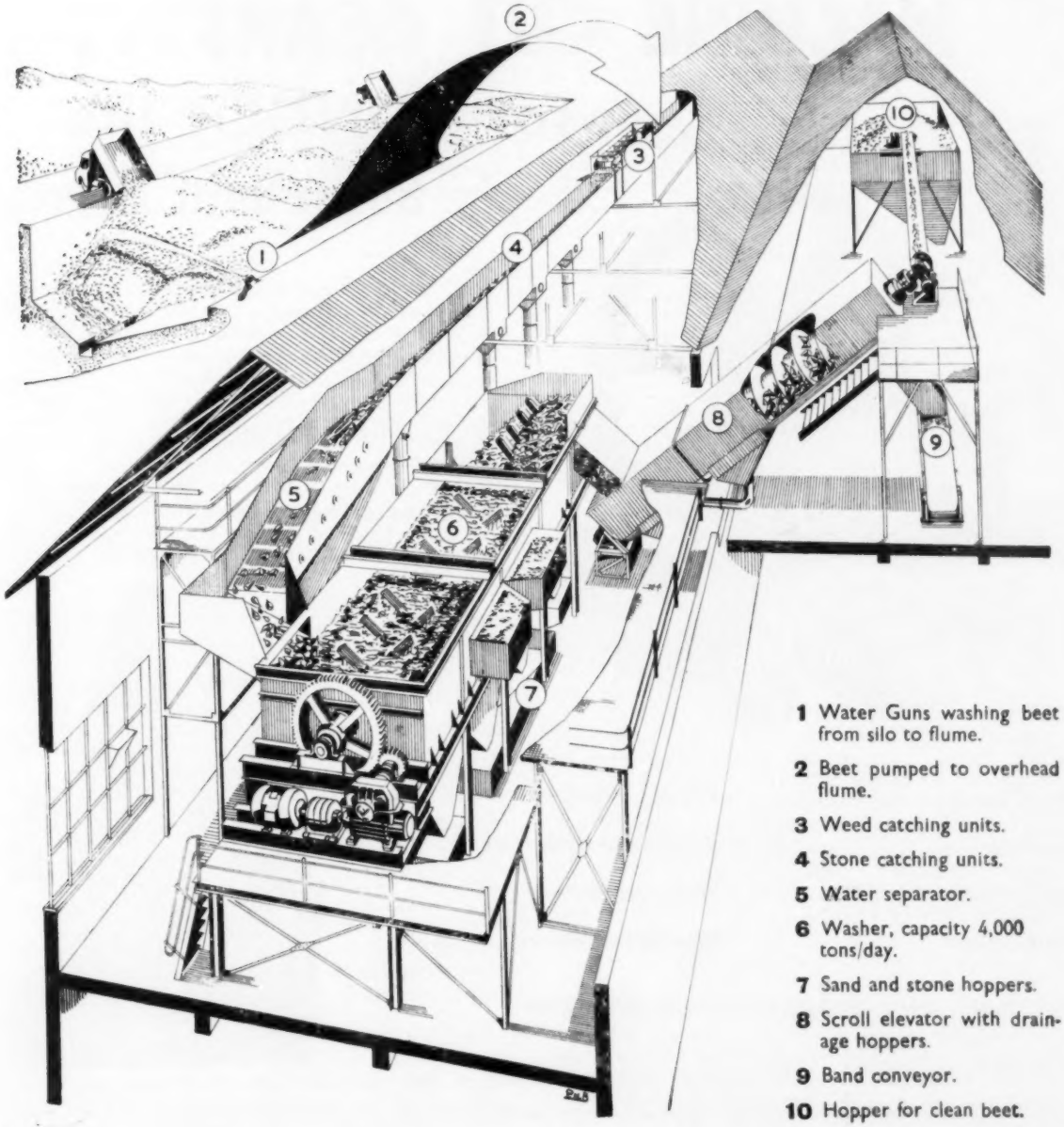
* * *

Chemical Removal of Evaporator Scale. *Tech. Rpt.* (Sugar Research Inst., Queensland), 1959, (52).—Laboratory and factory experiments have established the best concentration of HCl at 1·5 to 2 per cent inhibited by the addition of 5 per cent final molasses. Under these conditions scale removal was effective at 160°F with a minimum of corrosive effect on both mild steel plates and brass tubes. Scale removal was

[1] Cf. *I.S.J.*, 1953, **55,** 103.
[2] "La Sucrerie de Cannes" (Dunod, Paris). 1950. p. 120.
[3] *I.S.J.*, 1955, **57,** 191.

BEET WASHING PLANT

AS SUPPLIED TO THE BRITISH SUGAR CORPORATION LTD



1 Water Guns washing beet from silo to flume.

2 Beet pumped to overhead flume.

3 Weed catching units.

4 Stone catching units.

5 Water separator.

6 Washer, capacity 4,000 tons/day.

7 Sand and stone hoppers.

8 Scroll elevator with drainage hoppers.

9 Band conveyor.

10 Hopper for clean beet.

COCKSEDGE & Co. LTD

Telephone
Ipswich 56161 (5 lines)

IPSWICH ENGLAND

Telegrams
'Cocksedge, Ipswich'

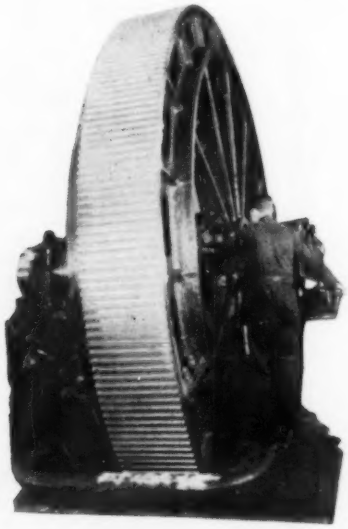
Crofts

MACHINE CUT GEARS . . .

. . . for *LONGER* life

in Sugar Mill Drives

- Expertly Cast
- Carefully Machined
- Thoroughly Tested



Internal gears	Bevels and mitres
Spur gears	Spiral bevels and mitres
Single helicals	Racks and pinions
Double helicals	Worms and wheels

Capacity production for spurs and helicals up to 185 in. diameter

Send for publication 159/Q

CROFTS (ENGINEERS) LIMITED

POWER TRANSMISSION ENGINEERS

Bradford 3, Yorkshire, ENGLAND

Telephone : 65251 (20 lines). *Telegrams* : "Crofters Bradford Telex", Telex 51186

REPRESENTED THROUGHOUT THE WORLD

assisted by pre-treatment with caustic soda, but it is considered that this is governed by the composition of the scale, and acid treatment alone should be effective in many cases.

* * *

Removal of Suspended Solids from Cane Juice. *Tech. Rpt.* (Sugar Research Inst., Queensland), 1959, (53).—This report describes tests carried out with a 6-inch "Dorrclone" in a selected factory. Removal of 90% of sand coarser than 150 mesh was effected, and it is considered that the installation of such separators is warranted where much soil enters the factory with the cane, owing to mechanical harvesting. Methods of washing the removed solids to recover juice are discussed. Good results were obtained with a settling cone.

* * *

Low Grade Crystallization and Sugar Recovery. *Tech. Rpt.* (Sugar Research Inst., Queensland), 1959, (54).—As molasses viscosity is the major factor limiting the crystallization process in the sugar factory, a "target" purity is defined as the true purity of final molasses when the viscosity reaches the selected value of 1000 poises. This bears a close relationship with R.S.:Ash ratio of the molasses. Studies were also made of the value of cooling B massecuites: a purity drop of four units was recorded when the massecuite was held at final pan temperature for two hours. Cooling effected a further drop, but this might affect the purity of the B sugar at the centrifugals.

* * *

The Hydraulically Loaded Mill. *Tech. Rpt.* (Sugar Research Inst., Queensland), 1959, (55).—This report records the results of comparative tests with the experimental mill, first with a fixed top roll, and then with the top roll hydraulically loaded. Where periodical variations occur in crushing rate, the hydraulically loaded mill is more effective in controlling juice extraction, and is considered superior to the killer-plate control on engine speed. It is important, to obtain best performance, that the applied load is such that the roll moves freely, and results indicate that a load of 50 tons/ft of commercial mill roll should maintain high levels of pol extraction. Coarse preparation required somewhat more load than did fine preparation for equal extractions. Mill ratio need not exceed 2:1 provided the mill is feeding properly. Changes in ratio due to top roll movement need not cause large changes in extraction, if the ratio is sufficiently low.

* * *

Division of Roller Load in the Three-Roll Mill. *Tech Rpt.* (Sugar Research Inst., Queensland), 1959, (56).—Investigations described indicate that prediction of roll loading from press tests cannot be regarded as reliable. Results from the experimental mills and direct tests on a new mill at Fairymead suggest a ratio of delivery to feed load within the range 2 to 5 : 1.

Ultrasonic Detection of Flaws in Mill Roller Shafts. *Tech. Rpt.* (Sugar Research Inst., Queensland), 1959, (57).—This report records results obtained by the use of the ultrasonic flaw detector in the examinations of roller shafts in Queensland. The value of the unit is established, though care is necessary in interpreting some results where such factors as internal crystallization introduce discontinuities.

* * *

Heat Transfer in the Evaporation of Sugar Solutions in a Vertical Single Tube Evaporator. H. REERINK, C. H. DORGELO and H. KRAMERS. *De Ingenieur*, 1958, **70,** (24), Ch. 11–14; through *S.I.A.*, 1959, **21,** Abs. 317.—Further tests have been carried out in an experimental apparatus comprising a single steam-jacketed stainless steel evaporator tube, 20 to 50% refined sugar solutions being evaporated at 0·3 or 1 atm pressure. Graphs are given showing the relations between the heat transfer coefficient and sugar content, rate of juice supply, or apparent liquid level in the tube, for single pass operation or with natural circulation. With high concentrations and at a high rate of evaporation, single pass operation is preferred; with low concentrations and evaporator rates, natural circulation will probably be better.

* * *

"Elguanite" Selective Juice Clarification Process Tested at Central Cortada. M. A. BALLESTER. *Sugar J.* (La.), 1959, **23,** (1), 40–43.—A new process has been developed using "Elguanite"[1] as clarifying agent. The crusher and 1st mill juice are segregated as "primary" juice while the juice from the remaining mills—"secondary" juice—is heated to 180–200°F and treated with a 12°Bé solution of "Elguanite" in the flash tank before it enters the secondary clarifier. Clear secondary juice is mixed with the primary juice, its pH being sufficiently high to require only a small amount of mile to give a clear "primary+secondary" juice of pH 7·2–7·4 from the primary clarifier. The clarifier muds are combined and sent to the vacuum filter from which the filtrate is sent to the secondary juice tank. The process yields less final massecuites and lower final molasses purities, and figures are quoted to show that it is more economical than normal defecation.

* * *

Increasing Milling Capacity at Central Plata. R. LABIOSA. *Sugar J.* (La.), 1959, **23,** (1), 49–50.—The tandem at Central Plata was designed for 2500 tons/day, but is crushing 5200 tons. This is made possible by a number of factors including a higher roll surface speed (64 f.p.m. *vs.* 47·5); thorough preparation (2 sets of knives and a Searby shredder taking about 1150 h.p.); very even feed to the mills; and optimum roll grooving chosen after considerable experimentation.

[1] *See I.S.J.*, 1951, **53,** 266.

Utilization of Reagents and the Neutralization of Juice After Ion Exchange Purification. G. S. BENIN and E. E. SCHNAIDER. *Trudy Tsentr. Nauch.-Issledov. Inst. Sakhar. Prom.*, 1958, **6**, 124–131.—Regeneration of cation exchangers with sulphuric acid and of anion exchangers with ammoniacal water yields two solutions which, when combined, give a mixture (20% by weight of juice and 4·5% dry solids content) containing 12–15 g N and 11–17 g K per 100 dry solids. This can be evaporated and used as fertilizer, although it requires removal of a large amount of water. Tests on the relationship between the density of the mixture and that of the original regenerants were carried out. It was found that 2% NH_3 was adequate and that doubling this concentration gave no increase in the bound ammonia. With such a concentration the maximum dry solids of the effluent was 10·5%, increasing to 16·8% with 5·04% NH_3. The maximum concentration of the effluent obtained by varying the sulphuric acid concentration was 5% at 5·18% acid. Hydrolysis of the ammonia salts during evaporation of the mixture gave a condensate of pH 9·5–10·0, the pH of the concentrate falling from 8·3–8·4 to 4·9–5·0, depending on the density. Concentration of the mixture was accompanied by deposition of a blackish-brown colloidal precipitate on the heating surface of the evaporator. At a concentration greater than 30% there was also a slight crystalline precipitate on cooling. The most suitable apparatus for evaporation is a forced circulation vessel with individual condenser and conical settling chamber. Juice treated with KU-1 cation- and AN-1 anion-exchangers was found to have a pH lower than 7 as a result of low acid-retention of the AN-1 resin. The amount of alkali required to neutralise the juice was examined and found to depend on the juice purity as well as the pH. Thus a juice of pH 3·3 and purity 91·7 required twice as much alkali as juice of the same pH and a purity of 95·2, as a result of the buffering action of the lower purity juice. Factory juices were titrated with 0.1N NaOH phenolphthalein and bromothymol blue as indicators, and the results are tabulated.

* * *

New Loading-Carrying Vehicle for Bulk Loads—The Autoshovel AL-1-Tsins. V. A. NOVIKOV and N. M. KICHIGIN. *Trudy Tsentr. Nauch.-Issledov. Inst. Sakhar. Prom.*, 1958, **6**, 164–174.—A mechanical shovel designed at the Central Institute is described in detail, with illustrations.

* * *

Experience of Early Campaign Start. M. P. PRIIMAK. *Sakhar. Prom.*, 1959, (4), 16–17.—Slicing started on 30th July 1958 at Koronevsk factory, where the previous two campaigns have started in August. The advantages claimed for an early start are discussed with actual factory data for August. At this time of the year beet should not be stacked for more than 1–2 days before processing.

* * *

Regeneration of Lime. A. S. KRENDEL'. *Sakhar. Prom.*, 1959, (4), 20–27.—A scheme based on practice at a paper mill is proposed for processing of carbonatation muds in rotary kilns to yield CO_2 and lime for normal processing.

* * *

Methods of Increasing Lime Kiln Output. D. S. SHEVTSOV, L. A. ZALEVSKAYA and G. M. GLAGOLEV. *Sakhar. Prom.*, 1959, (4), 28–34.—To increase kiln capacity the lime stone should be sorted and each factory supplied with stone of one and the same size. Where stone less than 80 mm in size is used a blower or extractor fan should be added to reduce the increased resistance of the kiln to air flow. Three schemes for their installation are suggested. Various types of charging equipment are described with diagrams.

* * *

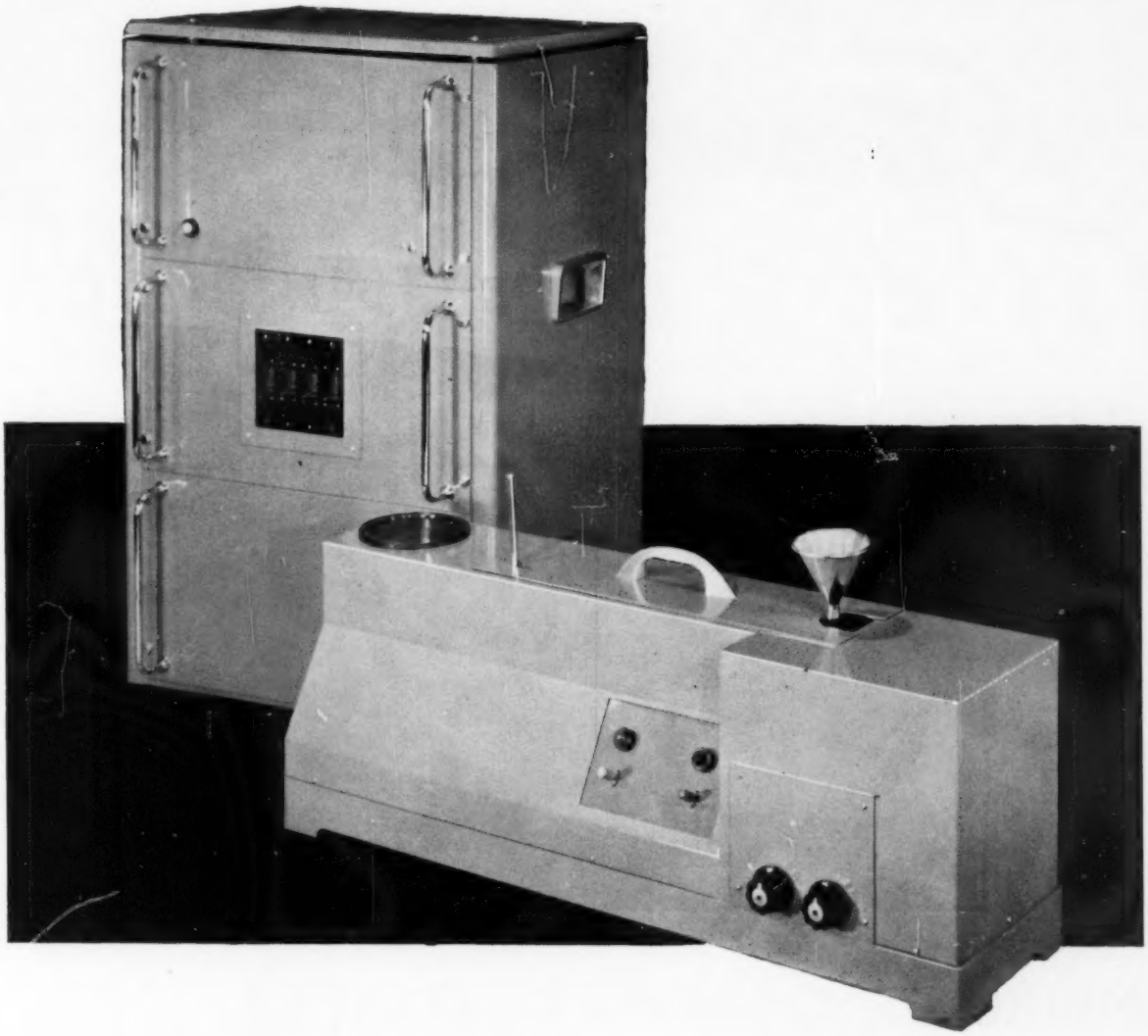
A New Scheme for Diffusion Juice Purification. P. V. GOLOVIN and A. A. GERASIMENKO. *Sakhar. Prom.*, 1959, (4), 40–41.—Diffusion juice is limed and heated to 90°C, over-carbonatated to pH 9, and filtered. Trisodium phosphate (0·02% on juice) is added to reduce the lime salts content, and the juice is re-filtered. The juice is then cooled to 20°C and subjected to 4-stage ion exchanger treatment (cation-anion-cation-anion). Colourless juice of 94·9–97·5 purity and of satisfactory filtrability has been obtained.

* * *

Experiences at Gnivansk Factory. D. P. IL'IN. *Sakhar. Prom.*, 1959, (4), 42.—The lime salts content of carbonatation juice is halved by subjecting the liming and carbonatation tanks to blow-downs at the start of each shift, heating the limed juice to 85–88°C before 1st carbonatation, maintaining a 1st carbonatation juice alkalinity of 0·11–0·13% CaO, heating the juice to 101–102°C before 2nd carbonatation and filtering at 100°C. Good filtration and settling removed any dangers of juice clouding on passing to the evaporators, which needed no boiling-out for 120 days.

* * *

Porous Plastic for Filtration. B. E. KRASIL'SHCHIKOV. *Sakhar. Prom.*, 1959, (4), 42.—Good results have been obtained in past experiments with a plastic suitable for filtration at 60°C. Finely powdered sodium chloride was mixed with a polyvinylchloride resin (60% NaCl, 40% resin, 3% dibutylphthalate as plasticizer) and the mixture formed into 3–4 mm



AUTOMATIC POLARIMETRY

The Hilger M 500 Automatic Polarimeter is specially designed for use in the sugar and allied industries, and can be used for either continuous or batch sampling. The readings are presented in sugar degrees, and the output may be displayed in either digital or analogue form, and if desired, fed into a recorder. The M 500 has an accuracy of 0.05°S, and a range of measurement of 14°S, whose position may be chosen to cover any interval of 14° on the sugar scale.

Write for full details,

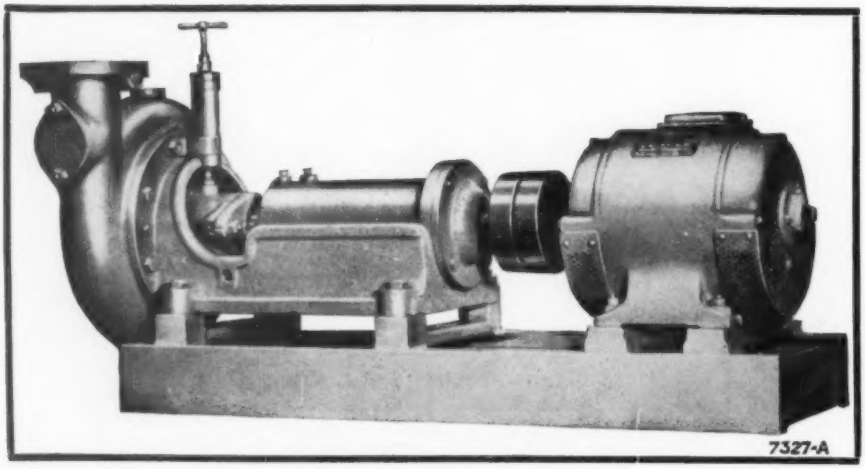
HILGER & WATTS

HILGER & WATTS LTD · 98 ST PANCRAS WAY · LONDON · NW1

Hilger & Watts Ltd., Witten, Germany · Hilger & Watts Inc., Chicago 5, U.S.A.

Streamline

MILL IMBIBITION PROCESS



MIRRLEES CHOKELESS PUMPS

Recent Installations:

VENEZUELA—
El Palmar and Rio Turbio;

PUERTO RICO—
Central Guanica;

CUBA—
Palma; Ermita, Providencia;

BRITISH WEST INDIES—
Basse Terre, Antigua, Corozal, Richmond, Rosehall, Hampden;

DOMINICAN REPUBLIC—
Boya, La Romana.

Install Mirrlees Unstrained Return Juice Pumps in conjunction with scraper, rotary or vibrating screens.

★

Full information on request:

MIRRLEES WATSON COMPANY LIMITED

Head Office and Works: SCOTLAND STREET, GLASGOW, C5.
London Office: 38 Grosvenor Gardens, S.W.1.

slabs at 200 kg/sq.cm. pressure and 150–160°C. The slabs were leached out for 5 days at 20°C, and found to be non-deformatory in water, resisting 20% alkali and acid. The slabs have been used in the china industry, and research on such plastics to replace filter cloths at temperatures above 110°C in the sugar industry is urged.

* * *

Heat Transfer on Boiling Highly Concentrated Sugar Solutions. I. I. SAGAN'. *Sakhar. Prom.*, 1959, (4) 44–47.—Heat transmission was studied with sugar solutions of 60–86% dry solids, boiled in evaporator tubes of 48, 87 and 150 mm i.d. under pressures of 0·4 and 1 atm. The optimal juice level climbs as the tube diameter and juice concentration increase, while the coefficient of heat transfer under optimal conditions remains almost unaffected by the change in tube dia. On the basis of results for Prandtl numbers from 1·72 to 1540, the formulae of KICHIGIN & TOBILEVICH and TOLUBINSKII are revised. The TOLUBINSKII formula is liable to error and is not given, while the revised form of the KICHIGIN & TOBILEVICH formula for specific cases is:

$$a_2 = A_2 q^{0.6}$$

where a_2 = heat transfer coefficient from tube wall to boiling liquid in kcal/sq.m./hr°, A_2 is a function of the physical properties of the given liquid, and q = heat flow in kcal/sq.m /hr. Graphs are given, including one in which A_2 is given as a function of concentration and boiling time.

* * *

Technological Evaluation of Vacuum Pans. V. D. POPOV. *Trudy Kiev. Tekhnol. Inst. Pishch. Prom.*, 1958, **19,** 23–37.—Equations and graphs are presented expressing the changes in value of various functions during boiling. Such functions include massecuite and mother-liquor dry solids and purities, and crystal concentration. Graphs and equations are also given demonstrating the relationship between crystal yield and boiling time. The work is designed to help in further research on boiling.

* * *

Gyroscopic Phenomena in the Movement of Suspended Centrifugals. M. I. BOVDA. *Trudy Kiev. Tekhnol. Inst. Pishch. Prom.*, 1958, **19,** 147–160.—Equations are presented to describe the movement of a suspended centrifugal, as an inverted gyroscope, during spinning, washing, and braking. These permit evaluation of certain factors arising as a result of deviation of the centre of gravity of the centrifugal from the pivot axis. It is suggested that the effect of these factors on the movement of the centrifugal should be the subject of future research.

* * *

Determination of the Massecuite Separation Period in Discontinuous Centrifugals. K. A. BORTNOVSKII. *Trudy Kiev. Tekhnol. Inst. Pishch. Prom.*, 1958, **19,** 161–171.—For purposes of calculation the centrifugalling process is split into 3 steps (the removal of intermediate molasses, the washing of the crystal sugar with water and removing the run-offs, and steaming of the crystal sugar with removal of further washings) and theoretical equations are developed relating the times of each step.

* * *

Towards the Theory of Conical Centrifugals. G. A. SABURDO. *Trudy Kiev. Tekhnol. Inst. Pishch. Prom.*, 1958, **19,** 173–176.—Equations are presented for calculation of the speed of movement of particles in conical centrifugals. These take into account gravity force, in contrast to previous equations, and basket arrangement. The time fractions for the various operations may be calculated, and the overall retention time of the particles, or inversely the size of basket required for a given time cycle as well as the various time zones necessary.

* * *

Calculation of Settlers for Solidly Settling Suspensions. G. A. SABURDO. *Trudy Kiev. Tekhnol. Inst. Pishch. Prom.*, 1958, **19,** 177–185.—Theoretical formulae are developed for calculation of settler efficiency, based on the relationship between the height of the column of clarified liquor and that of the thickened suspension after a given time. Laboratory tests were made with 1st carbonatation juice in measuring flasks, and graphs drawn relating the settling rates to the height of the column of suspension. At an optimal initial column height, the settling rate reaches a maximum; beyond this maximum the supernatant juice becomes turbid. The laboratory test described is recommended for evaluation of clarifier performance and design, and sample calculations are given.

* * *

Calculation of Heat Transfer Coefficients in 2nd Product Vacuum Pans. V. T. GARYAZHA. *Trudy Kiev. Tekhnol. Inst. Pishch. Prom.*, 1958, **19,** 187–193.—The heat transfer coefficient (K) may be calculated from the following formula:

$$K = (12{\cdot}1 D_m - 0{\cdot}0715\ D^2{}_m - 493)\left(\frac{R_i}{100}\right)\frac{1}{S}\ P^{0.4} q^{0.5}$$

where D_m = massecuite dry solids, R_i = purity of intercrystalline syrup, S = apparent supersaturation coefficient of the intercrystalline syrup, P = pressure in the vapour space in kg/sq cm, and q = heat flow in kcal/sq m /hr. If the heat flow is expressed by the effective temperature difference (Δt), the formula is modified to

$$K = (12{\cdot}1 D_m - 0{\cdot}0715 D^2{}_m - 493)^2\left(\frac{R_i}{100}\right)^6 \frac{1}{S^2}\ P^{0.8}\ \Delta t$$

and if the pressure on the heating surface due to weight of the massecuite (u in kg/sq.m/hr) is taken into account, the formula is further modified to read

$$K = r^{0.5}(12{\cdot}1 D_m - 0{\cdot}0715 D^2{}_m - 493)\left(\frac{R_i}{100}\right)^3 \frac{1}{S} u^{0.5} P^{0.4}$$

where r = latent heat of the heating steam (taken as as 540 kcal/kg). Single-column nomograms are presented, as well as isotherms for heating steam from

105° to 150°C in 5° intervals at a mean vacuum of 580 mm Hg and a mean temperature of boiling massecuite at 80°C. Other diagrams are given demonstrating changes in the values of the various factors during the boiling and sample calculations of K are given.

* * *

Continuous Massecuite Boiling. P. M. SILIN. *Sakhar. Prom.*, 1959, (5), 6–11.—A vacuum pan design for continuous operation is suggested. It comprises five chambers, the first for nucleation, the second and third for crystal development, the fourth for addition of washings and the fifth for final heavying-up and green syrup addition if required. Massecuite flow is direct, thorough mixing and circulation taking place in each chamber. The heavying-up period before passing to the crystallizers lasts 20% (instead of 60%) of the complete boiling time of 1½–2 hr, and the coefficient of supersaturation is 1·2–1·3 in the first chamber. Witkowitz heating elements are proposed, and provision is included for control of viscosity and supersaturation.

* * *

Increasing Filter Station Throughput. E. D. ZINCHENKO. *Sakhar. Prom.*, 1959, (5), 11–13.—Details are given of the carbonatation and filter station at L'govsk factory. Purification efficiency has been increased by 5–10% and throughput raised by predefecation of raw juice with 150–160% of returned first carbonatation juice, followed by first and second carbonatation. Advantages of the system include easier control of juice alkalinity and formation of larger $CaCO_3$ particles with consequent improved clarification.

* * *

Massecuite Centrifugalling. YU. D. KOT. *Sakhar. Prom.*, 1959, (5), 14–18.—The relationship between the thickness of the syrup film adhering to the crystals, which is independent of the crystal size or uniformity, and the viscosity of the intercrystalline syrup is expressed by the equation $B = a\eta^n$, where B is the thickness of the film, η is the syrup viscosity and a and n are constants. An artificial massecuite was laboratory-centrifuged and a graph drawn of viscosity *vs.* syrup film thickness. Empirical equations are developed, the final form, for calculation of the % syrup in the raw sugar (g_s), being:

$$g_s = 0{\cdot}9\left(\frac{0{\cdot}003\eta L}{2F_r\gamma B_1^2 t + 0{\cdot}003\eta L}\right)^{0{\cdot}41}$$

where η is the syrup viscosity in poises (g/sec/sq.m.), L the thickness of the raw sugar in the centrifugal (cm), F_r a separation factor (= 650 for the PS-1200 and 1200 for the PN-1000 centrifugals) γ is syrup density in g/cu.m., B_1 is the thickness of the syrup film on the crystal (cm), and t is spinning time (min). Factory results lay very close to the curve produced for the laboratory results above. A nomogram for purity of affined sugar has been drawn based on the relationships discussed and shows that for short spinning periods (4–6 min), a considerable improvement in affined sugar quality can be effected by increasing the size of the crystals during boiling and in the crystallizers.

* * *

Modernization of Clarified Liquor Discharge from Decanter-Clarifiers. V. N. PELETMINSKII. *Sakhar. Prom.*, 1959, (5), 21–29.—On average only 73·4% of the settling surface is used in the normal clarifier and to raise the clear juice output and quality it is necessary to increase the juice withdrawal area and reduce the effective radius, i.e. the distance from the juice orifice in the withdrawal tubes at which the juice flow rate is equal to the settling rate of suspended solids. This can be done by installing a number of concentric perforated pipes in each compartment, evenly spaced so as to provide the proper effective radius. The number of pipes will vary with the size of clarifier, e.g. four would be necessary to give an effective radius of 0·22 m in a 5·5 m dia. clarifier, while five would be necessary in a 6·5 m dia clarifier, giving an effective radius of 0·21 m. From theoretical equations the distance between orifices in these collector pipes should be 150–200 mm. It is recommended that the top compartment, normally used as a conditioning department and occupying about 30% of the total volume, should be reduced in size and used as a settling compartment with juice withdrawal tubes. By increasing the number of compartments to 8–10, the capacity could be increased by 4 or 5 times, or even more with parallel flow.

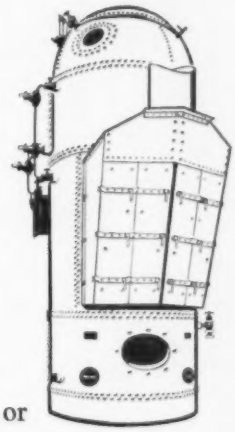
* * *

Calculation of the Capacity of a Cell-Divided Rotary Diffuser. E. T. KOVAL' and V. N. SHCHEGOLEV. *Sakhar. Prom.*, 1958, (5), 29–34.—The performance of a rotary diffuser is determined by the capacity of (1) the first cells, (2) that section of the cell above the cossette screen, (3) the receiving section below the screen, and (4) the cossette chutes. Other determining factors are the permeability of the cossette layer and of the screens. Three equations are developed for the relationship between diffuser capacity and each of the first three factors, of a general form: $A_x = 38{\cdot}4\,V_o\frac{n}{z}x$, where A_x is the daily throughput, V_o is diffuser volume, n is drum speed, z the number of cells in the diffuser, and x is the charging coefficient applicable to the factor concerned. The capacity of the cossette chutes is not considered to be a limiting factor, while, regarding the cossette permeability, a graph is presented of the time of percolation of juice (sec) *vs.* the cossette charge in kg/sq.m. of screen area.

* * *

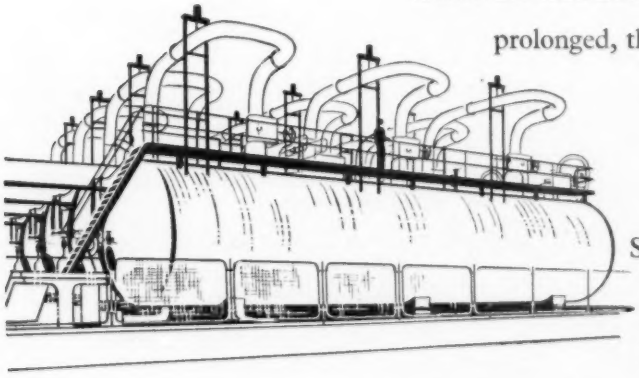
Study of the Performance of a Single-Column Bladed Diffuser. I. I. PRILUTSKII. *Sakhar. Prom.*, 1959, (5), 34–39.—Investigations were made on the distribution system of a pilot-plant tower diffuser designed by A. P. SOKOLOV. Increase in speed of rotation of the

steam pressure fluctuations



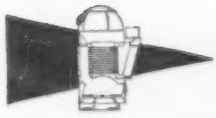
. . . are cause for anxiety and losses in many production processes. They are avoidable and where they exist consideration should be given to the means of overcoming them.

Cochran's can offer two. Where the variations in demand are not too great in relation to the boiler capacity the *Cochran Vertical Boiler with extended top belt* gives a reserve to accommodate varying demands without unnecessary changes in the boiler firing rate.



Where the load fluctuations are more violent or prolonged, the answer is in the installation of a *Ruths Steam Accumulator* to store surplus steam produced at off-peak times for release when the demand arises. A Ruths Steam Accumulator enables boilerplant to be run at a steady output and thus at its highest efficiency.

Do submit your fluctuating load problem to us.



COCHRAN VERTICAL BOILERS
RUTHS STEAM ACCUMULATORS

RUTHS

Cochran & Co., Annan, Ltd., Annan, Dumfriesshire, Scotland. Annan 111. 34 Victoria St., London, S.W.1. Abbey 4441

TAS/CH 654

No. 4-24

4 POINTS TO REMEMBER

- Norit expert advice wherever and whenever you may need it
- Norit representatives in all countries, to arrange prompt shipment
- Norit qualities to suit all local circumstances
- Norit active carbons, always competitive

NORIT

Write for full particulars! UNITED NORIT SALES CORPORATION LTD. - AMSTERDAM - HOLLAND

hollow-bladed shaft was accompanied by an increase in sugar losses, e.g. from 0·10% on beet at 1 r.p.m. to 0·32% at 5 r.p.m. Specific loading is altered by varying the shaft speed and is given as 7·8 tons per cu.m. at 5 r.p.m. and 5·8 tons at 1 r.p.m. Cossette flow up the column was found to be irregular; this was caused by blockage of the space between the bottom inner and outer screens by cossettes after a certain time. Optimal conditions were obtained at 4–5 r.p.m.; the rate of percolation of juice through the cossettes could be increased by increasing the circumferential speed of the blades (perhaps not necessary in larger diameter factory-scale diffusers) and increasing the surface area of the lower blades.

* * *

Theory of Beet Slicing with a Comb-Shaped Knife. P. S. SICHEVOI. *Sakhar. Prom.*, 1959, (5), 40–44.—The performance of comb-shaped beet knives[1] is studied theoretically. It is found that the slicing force of sharp knives is dependent on (1) the area of, the sides of the ribs, and (2) the resistance to compression of the beet tissue between the ribs which is a function of the distance between, and the thickness of, the ribs, and (3) the elastic modulus of the beet tissue, which varies with freshness, decreasing from 65–140 kg/sq.cm. for fresh beet to 18 kg/sq.cm. for withered beet. The effect of variation in the factors is illustrated graphically. The pressure between beet and knives required to ensure regular thicknesses of 2 mm can be effected by increasing the slicing rate to 16 m/sec. Among other recommendations are fine ribs of 0·1–0·2 mm thickness which do not need sharpening.

* * *

Decolorizing Ion Exchangers. VI. Regenerating Ion Exchangers. V. VALTER, K. CIZ and J. STAMBERG. *Listy Cukr.*, 1959, **75,** 121–125.—Tests were made on regeneration of decolorizing ion exchange resins. The method used depends on the characteristics of the individual exchanger, single stage regeneration (desorption) being adequate for strongly basic resins ("Wofatit L 165" and PA), two-stage regeneration (desorption and reactivation) being required for weakly basic (1A and 1M) and for amphoteric resins (5A, "Wofatit E" and "Centranol W 291", a Dutch resin). The coloured bodies were desorbed at e.g. 40–50°C, occasionally at 70°C, with a 1% solution of N/4 NaOH, elution being discontinued when the colour of the eluate had fallen below a pre-determined level, e.g. to 1–1·5°St. The resin was activated with HCl or NH_4Cl. Volume contraction on regeneration of the resins was found to be: 1A—45%, 1M—41% 5A—20–27%, "Wofatit E"—9–12%, stabilized 1A—8%, and PA—6%. "Centranol W 291" swelled again after treatment. As with normal regeneration all adsorbed colour bodies are not desorbed by NaOH, the adsorptive capacity of the resin will decrease in time.

* * *

Coagulation in Diffusion Juice by Simultaneous Defecation and Saturation at Lower Alkalinity. J. VASÁTKO and V. TIBENSKY. *Listy Cukr.*, 1959, **75,** 126–127.—Tests were made on 10 minutes' simultaneous gassing and liming of diffusion juice at 85°C to an alkalinity of 0·02% CaO. The amount of colloids precipitated was determined by the method of DUMANSKIJ & CHARIN[2]. The Dedek-Ivancenko filtration number and sedimentation rates were determined for (1) the simultaneous process, (2) progressive Dedek-Ivancenko preliming without gassing, and (3) progressive preliming with one subsequent gassing to 0·02% CaO. In each case a total of 0·35% CaO was added. The simultaneous process resulted in better filtration and sedimentation, the latter being at the rate of about 5 cm/min.

* * *

Progressive Predefecation of Beet Juice in a Counterflow Vertical Column. V. TIBENSKY, R. KOHN and J. VASÁTKO. *Listy Cukr.*, 1959, **75,** 128–136.—A tower defecation vessel is described with diagrams. It is divided into 7 compartments by discs with agitators below each disc. A section of each disc, subtending an angle of 60° at the centre, is lifted at an angle of 30°, so that juice swept around the disc surface passes through the gap below the inclined section and falls into the next compartment. A small segment is cut from each disc to permit upward flow of juice. Raw juice is fed at the bottom, lime being fed at 4 points to the top compartment. Thus the juice is recirculated and incoming raw juice meets a counterstream of limed juice. The treated juice is finally discharged at the top. Theoretical equations are presented, on which was based the design of the vessel, and results of tests with a laboratory model are tabulated. These compare favourably with those obtained with a Brieghel-Müller liming trough. The main advantages of the tower over the Brieghel-Müller trough are: no foam overflow, regardless of temperature; less space requirements; no side currents. The amount of recirculated juice and rate of liming can be regulated by altering the speed of rotation of the agitator paddles.

* * *

Continuous Juice Purification in Beet Sugar Factories. G. VERNOIS. *Listy Cukr.*, 1959, **75,** 136–138.—*See I.S.J.*, 1959, **61,** 280.

* * *

Dressings of Sugar Centrifugals. Their Introduction into the Baskets. E. KRIEG. *Ind. Alim. Agric.*, 1959, **76,** 267–271.—Detailed instructions, with diagrams, are given for the fitting and removal of the linings of sugar centrifugals.

* * *

Demineralization by Ion Exchange in the Ammonium Cycle. I. Laboratory Results. S. VAJNA. *Zeitsch. Zuckerind.*, 1959, **84,** 279–286.—Laboratory tests were made on demineralization of model solutions and of thin juice with ion exchange resins working

[1] See *I.S.J.*, 1959, **61,** 244.
[2] Effect of colloids on sugar refining. (Kiev.) 1950.

on the ammonium cycle. The apparatus used is described with illustrations, and graphs of the results are presented. Regeneration, heat resistance, and active life of the resins are discussed on the basis of the tests. The purity of juice was increased from 92·5 to about 99, and some resins were found to be active after some months with NaOH regeneration after each charge.

* * *

The Potassium:Sodium Ratio in Sugar Beet Press Juices during Vegetation. E. SOMMER. *Zeitsch. Zuckerind.*, 1959, **84**, 289–292.—Tests showed that the K_2O : Na_2O ratio undergoes marked fluctuations during beet growth and depends on harvest time, area in which grown, climatic conditions, type of soil and the available K and Na salts in the soil. Generally the K content is higher and the Na content lower with increased polarization.

* * *

New Process for Conveying of Defecation Muds. K. H. SCHÖNBERG. *Zeitsch. Zuckerind.*, 1959, **84**, 295–296.—At the Wetterau factory mud from the rotary filters and presses is conveyed about 300 m to the dryers via a vertical screw, equipped with apparatus for removal of foreign bodies. Compressed air at 2 atm is used for the feed line and the flow rate is 5–10 m/sec. Plant of this kind has been installed in the Linares (Chile) factory by the patentees, Büttner-Werke.

* * *

A New Method of Sweetening-off Defecation Muds. R. GOTTSCHALK. *Zucker*, 1959, **12**, 301–305.—Equipment installed by Walter Thron G.m.b.H. at Emmertal sugar factory in 1958 is described and illustrated. It comprises one main decanter for 1st and 2nd carbonatation juices with a thickener, and a battery of 4 counterflow clarifiers in series, in which the concentrate from the thickener is sweetened-off. Details are given of the automatic controls for the discharge valves and of the water consumption. Experiments show that the plant efficiency is comparable to that of other filtration equipment. During the 1958/59 campaign the throughput was 65 tons/hr of muds. At a draught of 125% and milk-of-lime addition of 4%, 1st carbonatation juice yield was 1400 litres/min, of which 65% (900 litres/min) was discharged from the decanter as clear juice, $\frac{2}{3}$ of the remainder being treated in the clarifier installation and the rest in presses.

* * *

The Storage of Sugar Beet under an Ice Coating. M. KHELEMSKII and N. KUDRYASHOV. *Kholodil'n Tekhnika*, 1958, **4**, 62–65; through *S.I.A.*, 1959, **21**, Abs. 274.—Beet clamps covered with a thin layer of insulating material are covered with a coating of ice during the winter months, and are then covered with an outer insulating material at the end of the winter so as to retard thawing during the spring (March-May). Fresh beet is thereby stored at a clamp temperature of 0–4°C, and beet that has been frozen by blowing an intense blast of air through the clamp is stored at – 6°C. The methods of building-up the ice layers on the clamp are described.

* * *

Extraction of Sugar from Beets. H. H. YANG and J. C. BRIER. *Amer. Inst. Chem. Eng. J.*, 1958, **4**, 453–459; through *S.I.A.*, 1959, **21**, Abs. 276.—An experimental U-shaped diffusion vessel has been used to investigate the mechanism of both simple and countercurrent diffusion of sugar from cossettes. The diffusion cycle was varied from 0 to 10 min, the extraction temperature between 65 and 80°C, and the amount of diffusion water from 1·0 to 1·2 lb/lb of beet. Graphs are given illustrating the different relationships, and equations are derived correlating the diffusion conditions. By integration of results of simple diffusion it is confirmed that the countercurrent process involves only a continuous simple diffusion of sugar from cossettes. A numerical example is given illustrating the derivation of an optimum cycle time for the continuous process.

* * *

Changes in Juice Purification for Work with Rotary Filters in the VEB Zuckerfabrik Haldensleben in the 1957 Campaign. W. EWERS. *Zuckererzeugung*, 1958, **2**, 146–148; through *S.I.A.*, 1959, **21**, Abs. 281.—The temperature of the pressure water for the diffusion battery was reduced from 70–75° to 60–65°C, and that of the battery from 75–80° to 70–75°C. All diffusion and pulp-press waters were fully re-used. The pH of the pressure water was kept at 5·5; higher values affect later sedimentation properties. Infection in the battery was prevented by adding formalin. Progressive pre-liming in 15 stages at 55° was followed by main liming at 80°C, and continuous 1st saturation on the countercurrent principle. Precipitates suitable for rotary filtration were then obtained. The effect of the mud pumps on the structure of the sediment is discussed.

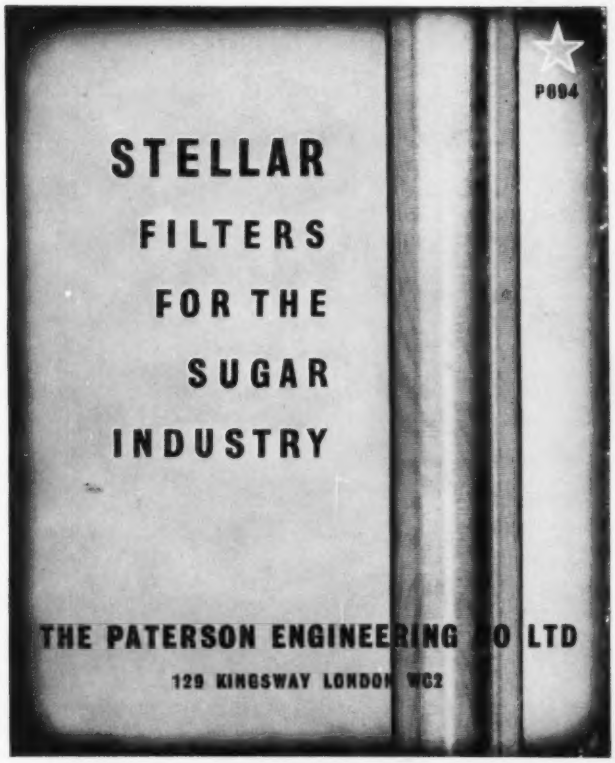
* * *

Influence of Atmospheric Oxygen on Corrosion in Extraction Plants. W. STRUBE. *Zuckererzeugung*, 1958, **2**, 154–155; through *S.I.A.*, 1959, **21**, Abs. 324.—Investigation of corrosion conditions in a continuous diffuser, with experiments on the potentials of the systems with Fe and Fe_3O_4 electrodes, a saturated calomel electrode, a gas electrode, and a blank Pt electrode, with gas bubblers and controlled redox potentials (rH value) at varying pH values, have shown that local elements can be formed between Fe and Fe_3O_4. The electrochemical conversion is dependentent on the pH and rH, being greater at lower pH or higher rH values.

* * *

Contemporary Sugar Centrifugals. T. KOWALCZYK. *Gaz. Cukr.*, 1959, **61**, 140–145.—Centrifugal drives and automatic controls are reviewed and details given of the construction of some centrifugals.

YOU MUST SEE THIS



It's the *new* booklet about a new filtration technique . . . STELLAR. In its pages are described and pictured the functions of Stellar Filters in the clarification and polishing of sugar syrups. You'll find it well worth reading. May we send you a free copy?

Write: Stellar Department
Paterson Engineering Co. Ltd.
129, Kingsway, London, W.C.2

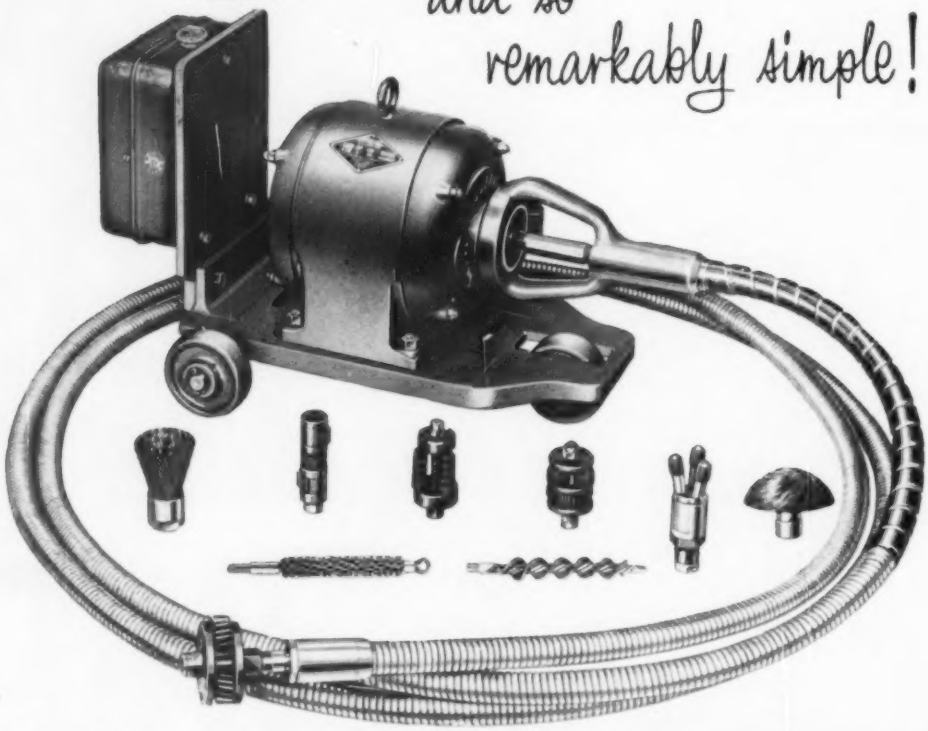
SKATOSKALO

TUBE & SURFACE SCALING EQUIPMENT

POWERFUL PENETRATING POSITIVE

and so remarkably simple!

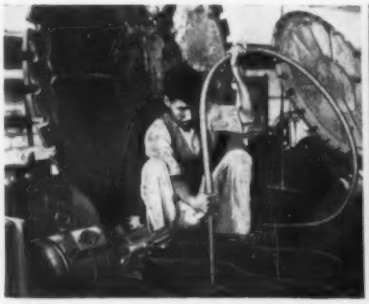
Electric, Petrol or Air driven.



Our unrivalled experience of scaling methods—and problems—has enabled us to develop a range of scaling machines, tools and accessories without equal.

However obstinate and tenacious the deposits become, "Skatoskalo" toolheads and brushes will remove them entirely, leaving clean burnished surfaces which delay the formation of fresh deposits.

Use "Skatoskalo" equipment regularly to restore boilers, economisers, evaporators, juice heaters, condensers and triple effets to full thermal efficiency.



CARLTON HOUSE
HIGH STREET

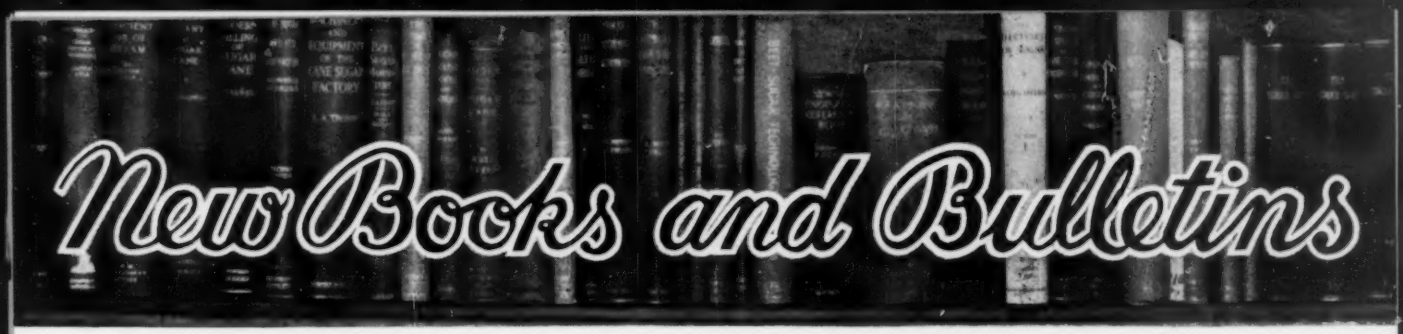
Flexible Drives (Gilmans) LTD.

SMETHWICK
STAFFS, ENGLAND

Cables: Skatoskalo Phone Birmingham

Code: Bentleys

AGENTS IN ALL CANE & BEET SUGAR PRODUCING AND REFINING AREAS.



Aluminium in Sugar Refining Equipment. 13 pp; 8½ × 11 in. (Northern Aluminium Co. Ltd., Banbury, Oxfordshire.) 1959.

This duplicated report by the Sales Development Division of Northern Aluminium describes the known applications of aluminium in the production of sugar with the results of previous investigations, and then deals with exposure tests on aluminium in various stages of the process. Aluminium has been successfully used in cane mill maceration troughs, conveyor buckets, white sugar pans, silo linings, sugar barges and rail cars, sugar liquor storage tanks, etc. The Northern Aluminium tests were with panels exposed for periods of 3 to 21 months in various parts of the refinery, including the brown and fine liquor tanks, char lights tank, char wash gutter, golden syrup scum tank and golden syrup liquor tank. It is concluded from these tests and the results of previous work that aluminium is suitable for use in cane-carrying equipment and liquor ducts up to the carbonatation stage; it is suitable for holding sugar liquors after char and after carbonatation, and also char lights and washings where heavy metal impurities can be reduced. It can be used in white sugar crystallizers but not for low-product equipment. It cannot be used for holding golden syrup liquor or scum under present conditions but can be used in contact with refined dry white sugar in the form of a harder alloy than pure aluminium. A new development, 3S alloy clad with 72S alloy which affords cathodic prevention, holds promise of application where aluminium might not be used because of pitting.

* * *

Cane Sugar Factory Control. 2nd Edn. K. C. BANERJI. 400 pp; 6 × 9 in. (Technical Literature Co., 40 Hazratganj, Lucknow, India.) 1958. Prices: Rs. 35.00; 70s. 0d.; $10.00.

This, the second edition of Dr. BANERJI's book originally publised in 1933, is described as "a complete treatise of the technical methods applied in the manufacture of plantation white sugar"—a somewhat misleading subtitle as the book is concerned purely with chemical control. Its chapters cover definitions, sampling and weighing, water in sugars and sugar products, polariscopes and polarization, reducing sugars and ash determination, factory routine control analysis and the techniques employed, mill control, boiling house control, stock-taking, pH control, special analyses, reagents and testing of apparatus, determination of colour and turbidity, some optical instruments, and forms and reports. Two appendices give a series of units and equivalents, and a number of standard tables of densities, Brix temperature corrections, etc.

The above indicates the detailed scope of the book which will undoubtedly be very useful to many chemists. It is marred however by misspellings, illustrations which are wrongly captioned, not referred to in the text, and in some cases upside down or printed on their side. The price seems rather high considering the quality of the paper and printing but the book is the most recent on the subject and as the author mentions in his preface, the chapters have almost all been enlarged from his first edition and new ones added on colour determination and optical instruments.

* * *

Bulk Delivery of Liquid Cane Sugar. 9 pp; 5½ × 7½ in. (Manbré & Garton Ltd., and Sankey Sugar Co. Ltd.) 1959.

Manbré & Garton Ltd. started delivering liquid sugar in bulk before World War II and have developed it to the stage where they have a large fleet of 5-15-ton road tankers able to discharge at the rate of one ton in three minutes up to a height of 75 ft. The type of reception tank most generally used is a 3000-gallon plastic-lined vertical cylindrical tank, and the technique lends itself readily to automatic operation. Data are given on the sugars and syrups available and tables of Brix density equivalents in a number of units, and also temperature corrections for Brix hydrometer readings and viscosity at 67°Bx.

* * *

The Indian Sugar Industry 1957-58 Annual. M. P. GANDHI. cviii + 69 + 44 pp; 6½ × 9¾ in. (M. P. Gandhi & Co., Sir Pherozshah Mehta Rd., Bombay 1, India.) 1959. Price: Rs. 6·00; Rs. 7.00 post-free.

The latest in this biennial series of handbooks follows the same pattern as previously, including a section "Sugar industry at a glance" embodying 47 tables of statistics of sugar consumption, production, prices, recoveries, costs, import duty revenues, stocks, etc., and a general section covering the sugar supply position, sugar cane problems, cane and sugar prices and sugar duties, sales tax and the Sugar Export Promotion Act of 1958, organizations concerning the sugar industry, and a list of important dates in the history of the Indian sugar industry.

The second part is a review of the sugar industry, in which aspects of its history are discussed, as well as 1957/58 data on sugar and gur production and consumption, cane production and prices, production costs, cane cess and research, by-products, the palm gur and sugar industry, and imports and exports of sugar and sugar machinery, sugar consumption, state sugar production, labour, and the world sugar situation. An appendix gives details of the sugar mills in Indian and Pakistan both extant and licenced for future erection.

Paper Chomatographic Studies on Sucrose Dissociation in Neutral, Alkaline and Acid Solution. R. WEIDENHAGEN and C. STELZIG. *Zucker*, 1959, **12**, 244–257.—See *I.S.J.*, 1957, **59**, 350.

* * *

Composition of Sugar Beet and Chemical Changes Occurring During Processing. A. CARRUTHERS, J. V. DUTTON, J. F. T. OLDFIELD, M. SHORE and H. J. TEAGUE. *Paper presented to the 12th Tech. Conf., British Sugar Corp.*, 1959.—Quantitative analyses of the cationic and anionic constituents of raw and second carbonatation juices were carried out and the changes occurring during juice purification are discussed. Extraction of K and Na from beet slices is high (86% and 89%), while that of Mg is lower (50%) and Ca lower still (10%). K and Na pass unchanged from raw to 2nd carbonatation juice; Ca is considerably reduced, while Mg is removed almost completely. About two-thirds of the non-sugars of raw juice are removed in clarification, while acids are formed by degradation of invert sugar and hydrolysis of glutamine, the latter also increasing the ammonia content of the juice. Further analysis of thick juices showed that virtually the whole of carbonate and bicarbonate is lost during evaporation, while loss of base as amide and ammonia nitrogen is from 60–85 mg/100 g sucrose to 4–6 mg/100 g. The net increase in base, together with the buffer capacity, must be at least equivalent to the acidity of the SO_2 used in sulphitation, and this governs the use or not of soda ash. Analytical techniques from the literature or which have been developed for measuring the content of nitrogenous materials in juices, including betaine; total amino-acids; pyrrolidone carboxylic acid; nucleosides, purine and pyrimidines; glutamine + asparagine; protein; and protein degradation products are described in detail. From the data obtained with factory samples it is apparent that more than 80% of nitrogen in clarified juice originates from betaine and amino-acids in raw juice; these are therefore a major factor in assessment of beet quality. Investigations were made into the variations of invert, raffinose, betaine, K, Na, and chloride during the campaign, as well as into the composition of different sections of the beet. The data obtained are considered in the light of the literature on synthesis of sugar in plants.

* * *

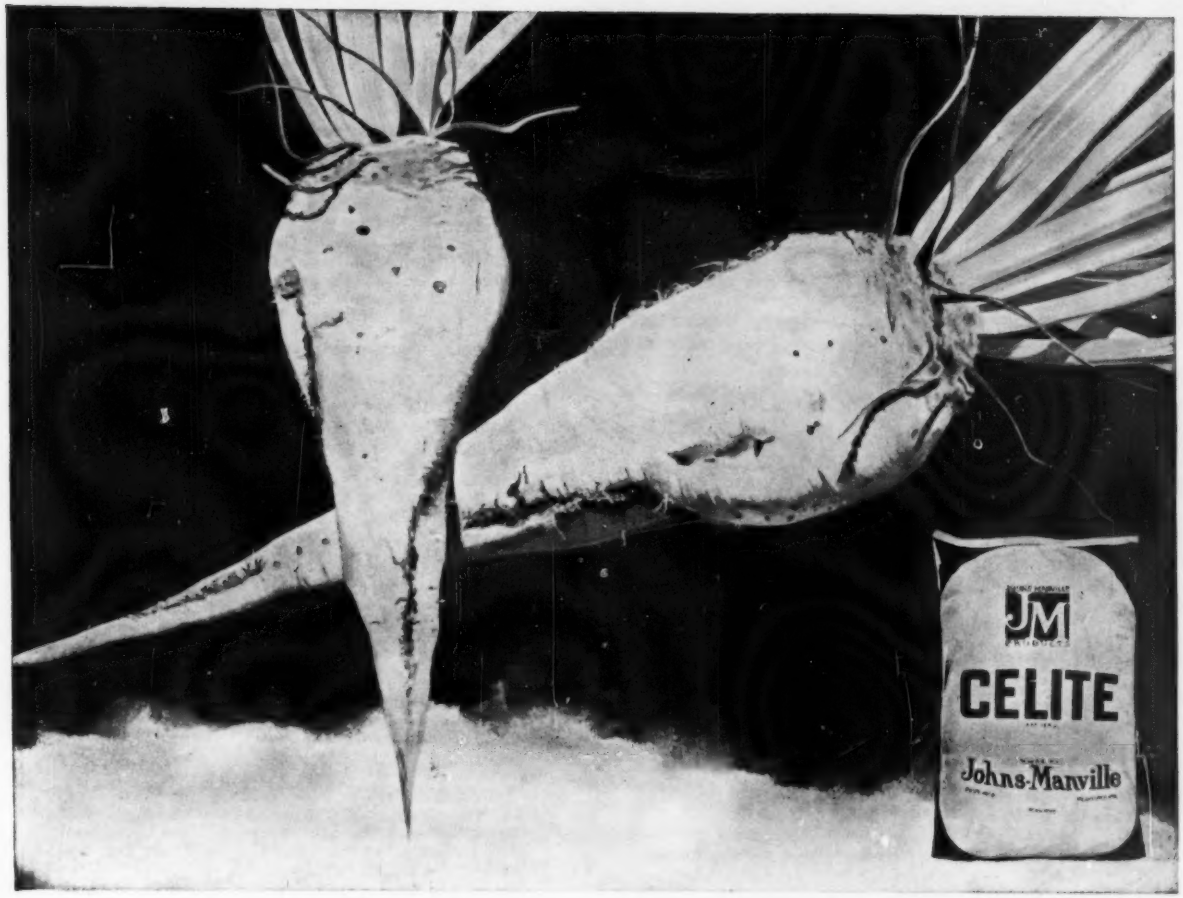
Use of Radio-Isotopes in the Sugar Industry. A. CARRUTHERS and J. F. T. OLDFIELD. *Paper presented to the 12th Tech. Conf., British Sugar Corp.*, 1959.—The techniques used in handling and using radio-active materials for examination of chemical problems are described and an account given of the use of ^{14}C-labelled compounds in several studies. These include the degradation of fructose on liming; synthesis of sucrose in beets; elimination of strontium in raw juice defecation and carbonatation; the origin of oxalate scale in evaporator tubes ; the efficiency of the ion exchange procedure for lactic acid determination; and detection of evaporator tube corrosion. A number of other applications are briefly discussed.

* * *

A Rapid Process for Control of Lime Salts by Determining the Effective Alkalinity. W. KRÜGER. *Paper presented to the 12th Tech. Conf., British Sugar Corp.*, 1959.—A rapid method for determining the effective alkalinities of juices was developed in order to investigate the considerable differences in lime salts exhibited by juices from Ameln and Elsdorf factories. Into the reaction vessel is placed 240 ml of diffusion juice or press juice adjusted to 13°Bx and the vessel stirred in a thermostatic bath at 85°C; after 2 minutes 3·8 g of C.P. $Ca(OH)_2$ is added (1·2% CaO on juice). After 10 minutes the limed juice is titrated with a 12·5% solution of phosphoric acid to the desired pH the addition time being 2 minutes exactly. After 5 more minutes at 85°C the juice is filtered through a fluted filter into a cooled receiver for immediate examination. Using phosphoric acid the effective alkalinity over 12 samples was found to be 0·004 units higher than when using CO_2. The method was used to examine the juices from the two factories and it was found that, at Ameln, formation of very fine pulp, insufficient cleaning of beet tails, and return of thickened sludge to predefecation led to juice deterioration and consequent higher lime salts, but a more important factor was the existance of a thick foam layer in the main defecation trough, caused by a leaky pump, which overflowed and was not defecated by proper contact with the lime and also was heavily infected with bacteria. This was remedied by attention to the pump, and a further decrease in lime salts was obtained by replacing the filter presses by a rotary filter which encouraged less bacterial infection.

* * *

Quantitative Determinations of some Non-Sugars and Partial Removal of One in Particular. P. N. BOYES. *Proc. 32nd Congr. S. African Sugar Tech. Assoc.*, 1958, 37–43.—Weekly analyses of sucrose, sulphated ash, invert sugars, gums, wax, starch, protein, potash, phosphate and soluble silica in final molasses are tabulated for Tongaat factory and the variations during the season discussed in relation to total non-sugars and also on a basis of 100 tons cane. Stickier massecuites coincided with higher gums, starch and protein, while the experimental filtration rate varied with the wax content. Some of the literature concerning starch removal by enzyme action is mentioned



How to get high clarity and fast flow rates by filtering beet sugar liquors *with Celite*

When you're filtering beet sugar liquors, Celite* gives you the clarity you want at the flow rate you need. Yes, Celite Filtration gives you crystal-clear liquor, free of sediment, haze and suspended solids; fastest flow rates for economical operation; and bacteria removal as small as 0.1 micron. And with Celite's wide range of grades you can achieve these benefits in the exact balance you require.

There is more working filter aid per pound than any other diatomite. Because of its lower wet density, six bags of Celite will do the work of seven bags of other diatomites. *You save almost* 15% *when you let Celite do your filtering.*

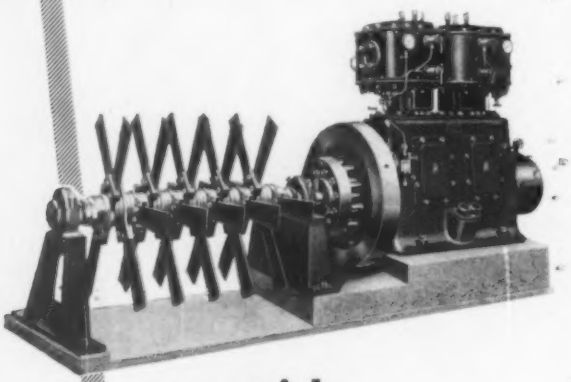
For further information about Celite, simply write Johns-Manville International Corp., Box 60, New York 16, N.Y., U.S.A. **For England and Continental Europe:** Johns-Manville Co. Ltd., 20 Albert Embankment, London, S.E.11.

* *"Celite" is a Johns-Manville trade mark registered in many countries of the world*

Other famous J-M products widely used in the sugar industry include: Packings and Gaskets, Insulations and Friction Materials

Johns-Manville CELITE FILTER AIDS

PARKER Steam Engines



provide economical power for the Sugar Industry

In factories and refineries throughout the world PARKER steam engines are providing reliable power from process steam at negligible cost. Simple and efficient in design, Parker engines require little maintenance and can be operated by unskilled labour. Unlike turbines Parker engines can be direct coupled without the use of costly reduction gearing and variable speed over side limits can be obtained without complicated control equipment.

Built in sizes from 10 *to* 1,000 *b.h.p.*
PARKER engines are all constructed to give long life with top economy under the most severe operating conditions.

Write now for full specifications and applications to:

ASHWORTH & PARKER LTD

RIVERSIDE WORKS · BURY · LANCS.

GUARANTEED

PROCESS PLANT

FROM OUR LONDON STOCKS

★ UNUSED DIESEL DRIVEN PORTABLE TARMACADAM MIXING PLANT by *Pegson*, 9/10 cu. ft. capacity with twin shaft steel mixer fitted renewable steel liners and quadrant door discharge, skip elevator feed, rotary geared bitumen pump. Drive by 16 h.p. *Lister* Diesel Engine. All mounted on steel road carriage with drawbar. FOURTEEN AVAILABLE.

★ No. 12 ATTRITOR by *Alfred Herbert*, driven by 50 h.p. 380/420/3/50 cycles motor, mounted on combined bedplate with starter and circuit breaker. Motor driven Rotary Feed Table and Belt Magnetic Separator. Welded mild steel Cyclone with rotary airlock, 8½ in. sq. inlet and top of cyclone.

★ ALMOST NEW EDGE RUNNER MILL by *Smith Blythe*, 7 ft. dia. cast iron pan 15 in. deep, single roller 3 ft. 6 in. dia. × 11½ in. wide. Directly driven by 12½ h.p. 400/3/50 cycles motor, positive gear drive, gears machined and running in oil, screw operated sliding discharge door. *Ellison* starting gear.

★ CENTRIFUGAL SWARF EXTRACTOR by *Broadbent*, 36 in. dia., lift-out mild steel basket with ¼ in. perforations at 1½ in. pitch, and lifting lugs. Three-point suspension, non-pit type, spring balanced lid with safety interlock and hand brake. Underdriven by 12/13 h.p. 400/3/50 cycles motor with starter. Maximum load 450 lbs., 750 r.p.m. SIX AVAILABLE.

★ UNUSED COLD STORE PLANT by *Wm. Douglas*, 100 tons capacity, comprising two 4½ in. × 4½ in. Ammonia Compressors, each driven by *Lister* Diesel Engine, one Horizontal Shell & Tube Condenser, one Liquid Receiver, Air cooler coils, double door, two single left-hand hung doors, three single right-hand hung doors.

★ FLEXTOOTH CRUSHER by *British Jeffrey Diamond*, 20 in. × 16 in., spring loaded adjustable breaker plate and renewable liners and hammer tips. Driven by 10 h.p. 400/3/50 cycles motor with starter.

★ VACUUM OVEN by *Francis Shaw*, 5 ft. wide × 7 ft. high × 8 ft. 9 in. deep internally. Hinged door each end secured by four handwheels. 17 mild steel platens at 3½ in. daylight, 6 in. vacuum, 3 in. steam and 2 in. condensate connections. EIGHT AVAILABLE.

★ No. 2 BLOOD DRIER by *Iwel Laabs*, riveted steam jacketed chamber 7 ft. × 3 ft. 11 in. with bolted endplates. Jacket 80 p.s.i.w.p. Atmospheric in chamber. Glanded bearings and gear driven. 7·5 h.p. required to drive.

★ PORTABLE CRUSHING & SCREENING PLANT, four-wheel chassis type, carrying 16 in. × 9 in. Jaw Crusher with underslung rotary screen and Diesel Engine drive. Capacity 8/10 tons per hour. SEVERAL AVAILABLE. Manufacturers—*Marsden, Pegson, Parker.*

These are representative items from our wide range of new and reconditioned Plant. Comprehensive stocks also include:

Power Plant, Hydraulic Plant, Contractors' Plant, Machine Tools, Lifting and Mechanical Handling Equipment.

May we put you on our mailing list?

GEORGE COHEN
SONS & COMPANY LTD
ESTABLISHED 1834
LONDON, W.12 Cables: OMNIPLANT, TELEX, LONDON

600 GROUP

and an account given of preliminary experiments on treatment of syrups and mixed juice with malt. Partial starch degradation (66–85·6%) took place even though the temperature was kept at boiling point for 25 minutes, the higher figures referring to experiments in which Tongaat clarification practice was simulated.

* * *

Determination of Juice Storage Cells Broken in the Milling Train. C. M. YOUNG. *Proc. 32nd Congr. S. African Sugar Tech. Assoc.*, 1958, 44–56.—Preliminary trials were carried out on the applicability of the KHAINOVSKY technique[1] to South African bagasse. The ultimate procedure evolved included very gentle oscillation of the suspended apparatus during the test, and a good shaking during the final evacuation cycle. Evacuation was increased from zero in steps of about 2 cm mercury per cycle, each cycle occupying 30 sec. The maximum vacuum applied was 50 cm Hg so that the overall time was at least 12½ minutes. The method is considered to give a good guide to the milling efficiency but further work is necessary on determination of free sucrose in order to have an accurate method for finding the number of cells broken at the end of the milling train.

* * *

Deterioration of Sugar Cane Molasses in Storage. J. M. SAHA, H. N. L. NARASIMHIYA, D. L. N. RAO and V. SINGH. *Indian Sugar*, 1959, **8,** 737–767.—About 1000 tons of molasses was stored in a tank from the inside of which sampling pipes extended to the outside, permitting the withdrawal of samples from different heights and radii in the tank. Samples withdrawn over the period February 1958 to November 1958 were analysed for Brix, pol, sucrose, reducing sugars, ash, dry substance, pH of a 10% solution, colour of a 1% solution, and fermentable and unfermentable sugars. The data are recorded in tables and graphs. It was found that deterioration commences with the beginning of the monsoon and becomes rapid during this period. Deterioration begins and is greatest at the top and is a minimum at the bottom of the tank with a deterioration gradient between these. This results in a drop in alcohol yield from the top layer of about 50% or 13% for the whole of the molasses. Frothing during the early part of storage does not apparently affect molasses quality. Deterioration is affected by height in the tank but not by distance from the centre of the tank. It is recommended that experiments be made with a layer of oil on the top of the molasses to see if this reduces deterioration.

* * *

The Futility of Determining Sucrose in Mixed Juice and Final Molasses. B. B. GAIROLA. *Indian Sugar*, 1959, **8,** 769–772.—The author considers that polarizations of cane products give more correct indication of their true sucrose contents than do Clerget sucrose values. His reasons are set out and pleas made for fitting polarization rooms with temperature control and examination of the chemical method for estimation of sucrose.

Thermo-Physical Parameters of Sugar Solutions. V. D. POPOV. *Trudy Tsentr. Nauch.-Issledov. Inst. Sakhar. Prom.*, 1958, **5,** 189–215.—Formulae, nomograms, graphs and tabulated data are assembled, expressing the various parameters used in calculations of sugar density, heat capacity, thermal conductivity, viscosity, PRANDTL's number and surface tension. The effect of non-sugars on the thermo-physical parameters is discussed and a number of corrections given for calculation of the effect. A graph is given of the heat transfer in boiling sugar solutions of up to 80% concentrations, based on the formula of KICHIGIN and TOBILEVICH[1].

* * *

Determination of the Standard Purity of Final Molasses. N. I. GRIZODUBOV. *Sakhar. Prom.*, 1959, (5), 18–21.—The purity of final molasses depends on the method adopted to determine the dry solids content, e.g. SILIN's criterion of 82°Brix for "standard molasses" by direct refractometry corresponds to 83·5° by 1:1 dilution and 85° by normal dilution. The equations used in gauging molasses exhaustion must therefore be modified to suit the method of Brix determination.

* * *

Determination of the Purity of Sugar Solutions by Measuring the Electric Conductivity. A. LEMAITRE. *Sucr. Franç.*, 1959, **100,** 154–155.—The measurement of conductivity of sugar house products diluted to 28°Bx and relating this to the purity, as practiced in Sweden (and the U.K.[2]), is confirmed as accurate to within $\pm \frac{1}{2}$ unit, provided that the temperature is controlled to within $\pm \frac{1}{2}$°C of 20°C and the same instrument is used as was used for preparing the calibration graph. It is pointed out that alteration of the non-sugars, e.g. by addition of Na_2CO_3 towards the end of a campaign, will make the original calibration graph invalid.

* * *

Moisture Determination in White Sugar by the Karl Fischer Titration Method. R. HOFFMANN. *Zucker*, 1959, **12,** 274–278.—Tests have shown that the Karl Fischer titration method of moisture determination is rapid and suitable for white sugar. Using a test sugar to standardize the solution[4] permits results to be obtained in close agreement with those obtained with the vacuum-oven drying method.

* * *

Rapid Determination by Paper Chromatography of Invert Sugar in Factory Juices. V. PREY and F. STADLER. *Zeitsch. Zuckerind.*, 1959, **84,** 286–289.—Quantitative determination of invert sugar is carried out with a glass fibre paper impregnated with sodium-water glass solution, phenol-water-acetone ethyl ether (100:25:125:200 w/v/v/v) being used as solvent, and a 0·5% solution of triphenyltetrazoliumchloride in 2 N aqueous KOH solution as spray reagent. Analysis takes 80 min and satisfactory results are obtained. R_f values are: sucrose 0·07; glucose 0·34; and fructose 0·39.

[1] *Proc. 3rd Congr. I.S.S.C.T.*, 1929, 457.
[2] *I.S.J.*, 1959, **61,** 340.
[3] *I.S.J.*, 1959, **61,** 9.
[4] *See* E. EBERIUS: Wasserbestimmung mit Karl-Fischer-Lösung. (Verlag Chemie, Weinheim.) 1958.

Effect of Saponin on the Separation of Amino Acids by Paper Chromatography. P. EBREY. *Chemist-Analyst*, 1959, **48**, 36.—Interaction of carboxyl and amino groups cause difficulties in paper chromatography of amino acids. If the developing agent used is phenol saturated with a 20% aqueous saponin solution, this is prevented, e.g. the molecular compound of arginine and glutamic acid is separated into its components, and lysine, which shows a number of spots with phenol:water, appears as one discrete spot. Coloured spots obtained by spraying with ninhydrin fade quicker than do spots obtained using phenol: water. R_f values recorded include: aspartic acid 0·08; glutamic acid 0·21; glycine 0·36; asparagine 0·39; lysine at pH 2, 0·48; lysine at pH 7–12, 0·55; threonine 0·56; histidine 0·60; arginine 0·70; methionine 0·75; alanine 0·75; histamine 0·77; and proline 0·90.

* * *

Importance of Pol Java Ratio in the Chemical Control of Cane Sugar Factories. V. G. PARANPAN. *Sugar News* (Philippines), 1959, **35**, 113–121.—The extent to which a number of factors affect the Java ratio is investigated on the basis of chemical control data for the author's factory. Assuming a 5% high or low error in these factors, the consequent change in Java ratio and loss figures are calculated. An error in mixed juice weight appreciably alters the Java ratio and losses as did an error in pol % mixed juice. An incorrect crusher juice analysis caused a change in the recoverable sugar according to WALKER's table, while an error in the gross cane weight affected only the recoverable sugar % gross cane appreciably. When the pol % bagasse figure was incorrect this was found to affect only the bagasse and total loss figures, while an error in fibre % gross cane affected Java ratio, bagasse and total losses, but only when the error was 5% high. It is concluded that the pol Java ratio is a useful guide in factory chemical control.

* * *

Destruction of Glucose in the Absence or Presence of Sodium Sulphite. J. DUBOURG and A. LEMAITRE. *Ind. Sacc. Ital.*, 1959, **52**, 160–166.—Colorimetric measurements were made on sucrose solutions heated for various intervals in the presence of NaOH, using as blanks similar solutions without the sugar, and the development of absorption peaks with degradation of the glucose moiety is demonstrated. Further adsorption graphs were prepared for the same contact times but at the pH of the solution and at pH about 1. The comparative adsorption curves prepared in the presence of N/10 Na_2SO_3 are reproduced and discussed; they are similar to those obtained in the absence of sulphite but show that this has a specific action on the glucose, which, however, only becomes apparent on acidification when a peak due to hydroxymethylfurfuraldehyde is obtained. The sulphite has a decolorizing action so far as the visible spectrum is concerned.

* * *

The use of Chromatography in the Sugar Industry. A. DRABIKOWSKA. *Gaz. Cukr.*, 1959, **61**, 146–150.—A review of chromatographic methods with 11 references to the literature.

Determination of Moisture in Sugar Products and Auxiliary Materials with the Modified Karl Fischer Method. S. ZAGRODZKI and Z. NIEDZIELSKI. *Gaz. Cukr.*, 1959, **61**, 150–154.—Determination of moisture in sugar, molasses, coal, coke, lime stone, pulp and beet seed using a modification of the Karl Fischer titration method is described. Results of tests compare favourable with those obtained by oven-drying, and the method is quicker than the dessication method.

* * *

Problems of Sugar Chemistry. V. PREY. *Zeitsch. Zuckerind.*, 1959, **84**, 337–341.—Analysis has shown a constant difference of 20–30% between the noxious nitrogen in factory juices (expressed as "blue number") and the amino acids removed by ion exchange treatment. This is attributed to peptide fractions containing only 2–3 bound molecules of amino-acids. Low molecular peptides are detected in a blue number but pass through the ion exchange column. The effect of the high M.W. peptides on final molasses purity and total yield was determined in comparative tests in which molasses samples were (1) treated by ion exchangers on the sodium cycle and (2) on the calcium cycle, and (3) untreated. The purity and N % dry solids before and after treatment were measured and the molasses re-boiled after adding crystal sugar; the results showed that ion exchange treatment permitted increased sugar yields which were higher from Ca-cycle exchanger-treated molasses than Na-cycle. The effect of nitrogenous compounds on colour formation during concentration and on molasses colour was also studied. Addition of amino-acids or betaine to sucrose caused an increase in colour, while addition of an acid (glutamic acid) or basic (lysine) amino acid caused stronger colour formation than the presence of a neutral amino acid (leucine), betaine having the same effect as a neutral amino acid. The pH in all cases was reduced with increasing reaction time, the solution remaining alkaline only in the presence of lysine. Chromatographic determination showed that hydroxymethylfurfural increases with addition of a neutral amino acid (leucine) and is substantially increased by glutamic acid and lysine, with further increase caused by betaine.

* * *

Rapid Determination of Raffinose in Sugar Factory Products by Paper Chromatography. V. PREY and E. HAMMER. *Zeitsch. Zuckerind.*, 1959, **84**, 341–342.—Glass fibre paper impregnated with citric acid buffer is used, with ethanol-acetone-water (20:20:10) as solvent. A solution of 300 mg anthrone in 10 ml glacial acetic acid and 20 ml ethanol with 3 ml phosphoric acid and 1 ml water added, is used as spray reagent. R_f values are: raffinose 0·30 $\pm$ 0·02, and sucrose 0·58 $\pm$ 0·03. An unidentified sugar, possibly kestose, lies between raffinose and sucrose. For the quantitative determination, codeine-sulphuric acid reagent (1:1000) is used, producing a red violet colour in the presence of oligosaccharides. The running time is about 1½ hr and accuracy is about $\pm$ 10%, sensitivity being about 5μg raffinose and selectivity below 1% raffinose in sucrose.

BY-PRODUCTS

The Effects of Various Levels of Raw Sugar in Growing-Fattening Rations for Swine. D. M. THRASHER, K. J. COULON, S. L. HANSARD, A. M. MULLINS and G. L. ROBERTSON. *Sugar Bull.*, 1958, **37,** 52–55.—Up to 50% raw sugar incorporated in pig feed had no effect on digestion or coat. There was little difference in the weight increase with 20% and 50% sugar, the latter causing a weight gain 11% faster than the controls. Data are tabulated.

* * *

Deionized Molasses for Poultry. E. ROSS and A. KOLDO. *Hawaii Farm Sci.*, 1957–58, **6,** (3), 4; through *S.I.A.*, 1959, **21,** Abs. 99.—The ratio of water consumed to feed poultry was plotted against the % molasses in rations fed to starter chicks and is compared to a graph showing the faecal moisture from such chicks. The faecal moisture was less for chicks fed deionized molasses than for those fed cane final molasses, but in both instances was proportional to the % of molasses in the feeds. The deionized molasses were virtually free from mineral salts (e.g. 0·05% K) after ion-exchange treatment.

* * *

A Study of the Possibilities of High-Test Molasses Production. T. R. ANCHETA. *Proc. Philippines Sugar Tech. Conv.*, 1956, 243–253.—An economic study has been made of the production of invert molasses by three processes. It is concluded that high-test molasses production should only be started when there is a big surplus of sugar over the total quotas and where the supply of final molasses is adequate. Intermittent production of sugar and high-test molasses might be useful where final molasses storage capacity is low; and sugar recovery should not be sacrificed for high-test molasses production.

* * *

Strawboard from Bagasse, Rice Straw and Cogon Grass. E. P. VILLAREAL. *Proc. Philippines Sugar Tech. Conv.*, 1956, 254–263.—Arguments are put forward for development of a strawboard industry in the Philippines, based on a survey of the material available, production methods, etc.

* * *

Pulp and Paper from Bagasse. B. M. BALASICO. *Proc. Philippines Sugar Tech. Conv.*, 1956, 264–266.—A brief account is given of the process used by the Cia. de Celulosa de Filipinas Inc. at Bais, and of recent developments in interest in bagasse as a raw material for paper products.

* * *

Sucrose as Chemical Raw Material. H. LANGE. *Gaz. Cukr.*, 1959, **61,** 34–39.—The 5 main categories of sucrose derivatives—products of oxidation, hydrolysis, fermentation degradation, and alkaline degradation, and sucrose esters and ethers—are discussed with 22 references to the literature.

* * *

New Technology of Molasses Processing at the "VEB Gärungschemie Dessau" Combine in the G.D.R. M. Z. KHELEMSKII. *Sakhar. Prom.*, 1959, (2), 61–64.—At this combine 125–130,000 tons of molasses per annum are processed to produce alcohol (306 litres per ton) and both solid and liquid CO_2. Yeast, with 40–45% protein content, is separated and dried. Most of the vinasse is carbonized and from this are isolated prussic acid (which is converted to sodium cyanide), sodium and ammonium sulphate, phosphate fertilizer, and potash (containing 30–35% K_2CO_3). Production of betaine hydrochloride of 99% purity was recently begun, and production of glutamic acid is to start shortly. Details are given of some of the processes.

* * *

Production of 2,3-Butanediol from Sugar Cane Molasses. W. R. DAMLE and H. B. DINKAR. *Indian Sugar*, 1959, **8,** 817–820.—Fermentation of cane molasses with suitable acclimatised *Aerobacter aerogenes* can give a yield up to 20% of 2,3-butanediol on sugar consumed, while higher yields can be obtained by preliminary clarification of the molasses. The diol in the fermented wash can be estimated by oxidising it to acetaldehyde with periodic acid and either measuring the amount of acid consumed or determining the acetaldehyde by measuring the blue colour formed with sodium nitroprusside. The product can be recovered from the fermented wash either by solvent extraction or by steam stripping.

* * *

Studies on Manufacturing Dissolving Pulp from Bagasse. M. HORIO and M. TAKAHAMA. *Bull. Inst. Chem. Res., Kyoto Univ.*, 1958–59, **36,** 172–180; through *S.I.A.*, 1959, **21,** Abs. 292.—Laboratory and semi-large-scale experiments have been made on the pulping of Indian bagasse, and on the possibility of using the pulp in the viscose process. The results are shown in tables and graphs, with photomicrographs of the pulp. It was very desirable to remove the pith before processing. Optimum conditions comprised pre-hydrolysis with 1% H_2SO_4 for 30 min at 170°C, with a liquor ratio of 10, and sulphate cooking at 170°C, for 30 min. For steam pre-hydrolysis a cycle of 3 hr was needed. The hydrolysis reduced the bagasse volume to less than half; the capacity of the pulping apparatus was thus affected. Bleaching was easier than with bamboo pulp, and 85–90% whiteness could be attained. The yield of final bleached pulp was only 20%. It would therefore be desirable to recover glucose or furfural from the residues. The fibre length (average 1·69 mm, with much of 1·0–1·5 mm length) led to poor filtrability and low mechanical strength, making the pulp unsuitable for the process without special techniques. It might be possible to use it by blending up to 30% in a mixture with longer-fibred bamboo pulp.

* * *

Market Promotion Researches for Bagasse Board. H. S. WU. *Taiwan Sugar*, 1959, **6,** (4), 22–26.—The Bagasse Utilization Development Centre was formed in 1956 with the objects of developing uses for bagasse board and of educating the public in the applications by public demonstrations, etc. The boards produced at Changhwa factory are used for house construction and insulation purposes, furniture making and in packing cartons.

UNITED STATES

Beet Harvester Ejection Device. E. J. HAMMER and O. H. HAMMER. **2,888,081.** 22nd November 1957; 26th May 1959.

* * *

Cattle Fodder. L. RODRIGUEZ FUENTES, of Havana, Cuba. **2,888,348.** 17th December 1958; 26th May 1959.—A *Torula* yeast slurry in water is added to moist cachaza in a mixer using 1 g of yeast per cu. ft. of cachaza, and the mixture "aerated" by passing through incondensable gases from the evaporator during 6 hours. This prefermented cachaza is dried in a standard dryer and mixed with blackstrap or invert molasses containing an equal quantity of solids as the cachaza. After mixing for about 4 hours the product is ground in a hammer mill to give a virtually non-hygroscopic powder.

* * *

Purification of Sugars. R. M. WHEATON, assr. DOW CHEMICAL COMPANY, of Midland, Mich., U.S.A. **2,890,972.** 2nd June 1955; 16th June 1959.—An aqueous sugar solution (beet or cane juice or a raw sugar solution) containing at least one highly ionized solute (e.g. potassium aconitate) is fed (at 25–80°C) to a column of ion exchange resin particles immersed in water, thereby displacing the latter. The resin is either a cation exchanger (nuclear-sulphonated copolymer of a major amount of styrene and minor amounts of *ar*-ethyl styrene and divinyl benzene, or its potassium salt) or an anion exchanger (containing quaternary ammonium groups as the functional groups attached to a copolymer of a major amount of styrene and minor amounts of *ar*-ethyl styrene and divinyl benzene) in a highly ionized state, with a gel water content of 50–90% (60–80%) by volume. Water is added thereafter to the column and successive fractions collected; this gives a fraction rich in the ionized solute and another rich in sugar. The process is continued adding sugar solution and water alternately to the same column, yielding solute-rich and sugar-rich fractions.

* * *

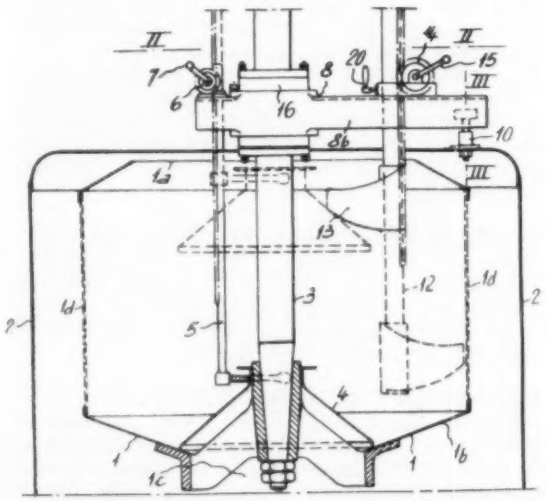
Recovery and Dehydration of Sugar Beet Tops (for Animal Fodder). W. N. MCLELLAN, assr. SINTON & BROWN CO., of Betteravia, Calif., U.S.A. **2,892,717.** 19th April 1957; 30th June 1959.—After harvesting of the roots, beet tops are left in the field for 1–6 days when their moisture content is reduced to about 70%. The tops are windrowed and harvested before carrying to a cleaner separator which removes the clods of earth, rocks, baling wire, etc. The tops are fed to a washer where the moisture content is raised to 77%, i.e. high enough to prevent burning in the dryer. Free water is removed by a vibrating screen and the tops shredded and carried by a stream of drying air through a dryer to give a final 10% moisture.

* * *

Continuously Fed Centrifugal. A. H. MCPHEE, C. A. OLCOTT, T. H. REID and F. STINDT, assrs. HEPWORTH MACHINE CO., of Long Island City, N.Y., U.S.A. **2,893,562.** 22nd June 1953; 7th July 1959.—Cf. U.K.P. 794,949[1].

* * *

Centrifugals. R. LEPOUTRE and A. GAUTIER, assrs. SOC. DES RAFFINERIES & SUCRERIES SAY, of Paris, France. **2,894,634.** 8th April 1957; 14th July 1959.—To prevent damage by contact of the spinning and oscillating basket of a centrifuge with the stationary scraper, the latter is mounted loosely on the centrifugal shaft 3. This shaft supports a sleeve 16 between two ball bearings and this carries the supporting arm 8, located by a shear bolt and provided with a bronze

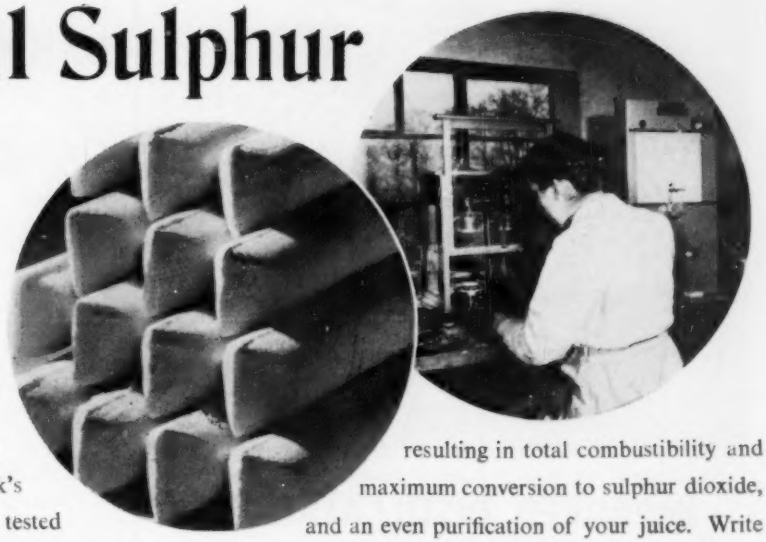


ring between the surfaces so that the shaft can still rotate within the arm if the bearing fail and the shear bolt fracture. The outer end of arm 8 is of inverted-section, fitting over a stop pin located on the casing and fitted with a rubber washer. The clearance around this washer permits limited rocking of the arm, and hence the shaft and basket, relative to the casing. The scraper blade 13 is attached to the rod 12 which is mounted on the arm 8 and controlled by the pinion and crank 14, 15 and locked by hand screw 20. The control mechanism 5, 6, 7 of the bottom discharge cone 4 is also mounted on arm 8.

[1] *I.S.J.*, 1958, **60**, 277.

Berk's Roll Sulphur

TESTED FOR UNIFORMITY



The mark that guarantees the product all over the world.

You buy quality when you buy Berk's Roll Sulphur—at a quantity price. Berk's bright yellow Roll Sulphur is regularly tested in modern laboratories and the absolute minimum of impurity is present. The ash content is non-existent, resulting in total combustibility and maximum conversion to sulphur dioxide, and an even purification of your juice. Write to us now and we will reply by return giving you shipping details and prices. It pays to buy your sulphur from Berk!

Overseas enquiries to

F. W. BERK & CO. Ltd. **Dept. HCS/SJ, STRATFORD, LONDON, E.15**

Cables: Berk London Telex 23796

CECA

For Sugar Refining :

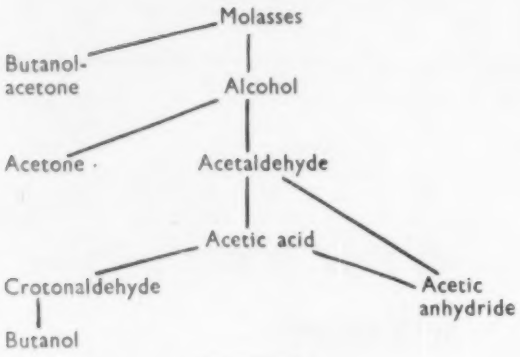
ACTICARBONE
activated carbons

CLARCEL
Filter aids

CARBONISATION ET CHARBONS ACTIFS
24, RUE MURILLO - PARIS 8e - TÉL : CARnot 82-00

IMPROVED DISTILLATION EQUIPMENT

FERMENTATION AND BYPRODUCTS INDUSTRIES



Ancillary industries :
Yeast and glucose manufacture

Planning
Projects and Engineering
Construction
Erection
Initial operation

SPEICHIM

Société pour l'Equipement des Industries Chimiques

14 rue la Boétie

PARIS 8 ème FRANCE

BASIC CALCULATIONS FOR THE CANE SUGAR FACTORY

By J. EISNER
(Technical Adviser, Booker Bros. McConnell & Co. Ltd.)

This new book is intended for the men who work in sugar factories and are responsible for the day-to-day operation of plant and process, and who have not the time—or inclination—for studying voluminous textbooks. Of convenient size and style it will be the valued companion of all cane sugar men.

Price: **7s. 6d.** or **$1·00** U.S. post-free.

Obtainable only from *The International Sugar Journal Ltd.*, Central Chambers, The Broadway, London, W.5.

CARY SUGAR CANE HARVESTER–CLEANER–LOADER

The Cary combination Harvester-Cleaner-Loader harvesting extremely recumbent 70 ton per acre cane and loading short lengths (15 in. or 22 in. lengths) into special side dump trailers. Capacity under Florida conditions 250-300 tons per day (cut, cleaned and loaded).

Manufactured by

CARY IRON WORKS
OPELOUSAS, LOUISIANA
(also manufacturers of Cane Trailers and Field Derricks)

Export Division
LOGAN PERKINS—SUGAR MACHINERY
International Trade Mart, New Orleans, U.S.A.

Process for Producing Sugar Esters. H. B. HASS, F.D. SNELL, W. C. YORK and L. I. OSIPOW, assrs. SUGAR RESEARCH FOUNDATION INC., of New York 5, N.Y., U.S.A. **2,893,990.** 12th December 1955; 7th July 1959.—Sucrose or raffinose is reacted (under substantially anhydrous conditions) with an ester of a (saturated) fatty acid containing 6–30 carbon atoms with a non-saccharide alcohol (glycerol or a volatile lower monohydric alcohol) in the presence of an alkaline catalyst (which will produce the characteristic magenta colour when added in 1% w./v. concentration to a 0·5% w./v. solution of phenolphthalein in a 50:50 mixture of boiled N,N-dimethylformamide and CO_2-free water), at a temperature of 20-180°C (60–120°C) and in the presence of a solvent (N,N-dimethylformamide). The molecular proportion of sugar to ester is at least 3:1 (3:1 – 2:1), and the volatile alcohol liberated during the process is removed from the reaction mixture by distillation substantially immediately.

* * *

Beet Harvester. K. B. SORENSON and H. R. LINDSTROM, of Rock Island, Ill., U.S.A., assrs. DEERE & CO. INC. **2,895,280.** 12th March 1956; 21st July 1959.

* * *

Heat Treatment of Sugar Beet Juice. A. I. MORGAN, of Berkeley, Calif., U.S.A., assr. U.S. SECRETARY OF AGRICULTURE. **2,898,245.** 16th June 1958; 4th August 1959.—Raw diffusion juice is passed through a heat exchanger to bring it to boiling and is then contacted with steam, under pressure so as to keep the juice in the liquid phase. The juice is held at 150–250°C for ¼–3 minutes and then immediately cooled to a temperature below its boiling point (e.g. by flashing), before liming and carbonatation. This treatment provides a juice of reduced foaming and smaller dissolved colloid content.

* * *

Method of Making Paper Pulp (from Bagasse). A. M. THOMSEN, of San Francisco, Calif., U.S.A. **2,898,994.** 31st March 1953; 11th August 1959.—Bagasse pith and fibre are separated by attrition and screening and the fibre digested with a solution of neutral sodium sulphite until the resident cellulose is free of incrustants. The cellulose is separated from the spent cooking liquor which is then incinerated. The product is dissolved in a solution of sodium carbonate obtained as described below and sodium carbonate crystallized from the mother liquor. This mother liquor is mixed with calcium carbonate and a portion of the bagasse pith and the mixture dried and fused; leaching yields the solution of sodium carbonate used to dissolve the residue from the spent cooking liquor. The crystallized sodium carbonate is purified from sulphide contaminated by teatment with zinc oxide and then neutralized with SO_2 to give fresh cooking liquor.

Clarifying and Desugarizing a Carbonatation Sludge. W. BUDDEBERG and P. M. F. H. NEBEL, assrs. KRAUSS-MAFFEI A.G., of Munich-Alloch, Germany. **2,899,342.** 2nd June 1954; 11th August 1959.—First or second carbonatation juice is heated and sent to a thickener which yields a clear juice layer and a sludge. The former is sent to a filter press while the sludge passes to a centrifuge. This may be of the horizontal continuous pusher type whereby juice passes through (and thence to the filter-press) while the mud is pushed to the open (discharge) end of the basket by way of a water-washing stage. Alternatively the centrifuge may be a batch-type machine with a kieselguhr precoat, provided with a skimming tube for removal of supernatant juice above the mud; this can be recycled to the thickener or sent to the filter-press, while the mud is washed and discharged in the usual way.

* * *

Storing and Digesting of Fibrous Agricultural Residues. C. BIRDSEYE, assr. PROCESS EVALUATION AND DEVELOPMENT CORP., of New York, N.Y., U.S.A. **2,899,350.** 16th July 1954; 11th August 1959.—Bagasse is evenly and thoroughly impregnated at 80°C with alkaline digesting agent (20–60 g NaO/litre) in sufficient quantity to raise the pH above 8·0 (10·0), so that it will not become acid in storage. It is adjusted to 25–80% (40–80%) moisture content and sterilized by heating to at least 80°C. A bleaching solution may be added, a protein-digesting enzyme added at 68–75°C and a basic solution poisonous to yeast cells. The bagasse is then stored for more than 30 days while maintaining below cooking temperature. It is removed from storage when the pH has fallen below 9·0 (to 7·0) and after approximately 20% of the original dry weight of fibre has been dissolved by the alkali.

* * *

Inhibiting Sugar Inversion. J. W. MCGAHEN, assr. E. I. DU PONT DE NEMOURS AND CO., of Wilmington, Del., U.S.A. **2,900,283.** 19th June 1957; 18th August 1959.—Inversion in raw cane juice caused by micro-organisms may be inhibited by adding at least 0·02 lb per ton of 3,3-di(alkylsulphonyl)propionitrile where each of the alkyl groups may have 1–4 carbon atoms (3,3-bis-(ethylsulphonyl)-propionitrile).

* * *

Filter. K. A. ANDERSON, assr. AMERICAN MACHINE & METALS Inc., of New York, N.Y., U.S.A. **2,903,160.** 23rd April 1956; 1st September 1959.—Cake is removed from the leaves of a precoat pressure filter by subjecting a frame, to which the tops of the leaves are attached, to high-frequency vibrations produced by suitable means, particularly a rotary vibrator. This avoids the necessity of stripping the filter for cleaning.

TRADE NOTICES

Statements published under this heading are based on information supplied by the firm or individual concerned. Literature can generally be obtained on request from the address given.

Sample Extractor. The Thames Sack & Bag Co. Ltd., 28 City Road, London, E.C.1.

A new sample extractor for liquids or granular or powdered solids is in the form of a narrow rod with a sharp point, graduated along its length for a distance of 22 inches. The sample is pushed into the container to the required depth and the knob at the outer end is turned by one revolution in an anti-clockwise direction. This action opens the door of a pocket at the bottom of the rod and conducts the material to be sampled into the pocket; on turning the knob in a clockwise direction the door is closed and the rod can be withdrawn from the container. The sample is liberated by turning the knob again in an anti-clockwise direction with the pocket held over a suitable sample container.

* * *

Flanged Ball Bearing Units. Sealmaster Bearing Divn., Stephens-Adamson Mfg. Co., Ridgeway Avenue, Aurora, Ill., U.S.A.

Two new series of bearings, the "LF" three-bolt and "LFT" two-bolt flange bearing units, have been announced. The housing permits either flush or recessed mounting, and the bearings are designed to give precision self-alignment between the spherical inner surface of the housing and outer diameter of the bearing. Centrifugal labyrinth seals retain the pre-packed lubricant and exclude dirt. The bearings are available in standard sizes ranging from $\frac{3}{4}$ inch to $1\frac{7}{16}$ inches.

* * *

The "Flite-Flo" Conveyor. Link-Belt Company, Prudential Plaza, Chicago 1, Ill., U.S.A.

The "Flite-Flo" conveyor is designed for horizontal or limited incline movement of free-flowing, granular, non-abrasive materials and comprises a covered trough with shafts at each end carrying sprockets, one of these being driven externally. The sprockets carry an endless strand of combination chain with spaced flights matching the contour of the trough and made of flexible non-metallic material stiffened with steel plates. The conveyors can move up to 16,000 cu.ft./hr for a 24-inch unit operating at 150 f.p.m.

* * *

The H.17 Semi-Automatic Weighing Machine. Richardson Scale Co. Ltd., Albert St., Bulwell, Nottingham.

Major modifications to the H.17 semi-automatic machine include provision of a quickly detachable sack-holder so that the holders can be interchanged in less than 30 seconds; a more sensitive cut-off gate trigger to provide more accurate weighing; an externally adjustable flow regulator to control the flow rate when changing from light bulky materials to dense granular materials; ball-bearings for the cut-off gate; and a more robust torsion bar light and heavy balance indicator.

PUBLICATIONS RECEIVED

STEAM BOILER PLANTS. Maschinenfabrik Buckau R. Wolf A.G., Grevenbroich-Neuss, Germany.

In leaflet F 1202 appear illustrations of boilers installed in sugar factories; they feature high working safety, optimum efficiency, first-class workmanship and testing; and special designs for all possible conditions.

* * *

STEEL CASTING. Crofts (Engineers) Ltd., Thornbury, Bradford 3, Yorks.

Castings by Crofts are to be specified whether the call is for one in a thousand or a thousand from one, according to a new leaflet, Publication No. 5938. This illustrates the continuous research and metallurgical control employed, the pattern shop and finishing moulds, together with some of the castings produced, including mill drive gearings and cane crusher rolls.

* * *

THE "KLEEN-KUT" PORTABLE BAG OPENER. Thames Sack and Bag Co. Ltd., 28 City Rd., London E.C.1.

The "Kleen-Kut" portable bag opener, designed for use with jute or paper sacks or any other bags, operates on either A.C. or D.C. single-phase current and has a completely enclosed cutter to prevent injury to the operator. It works rapidly leaving a clean-cut edge so that the bag can be re-used.

* * *

FULLY CONTINUOUS FLOW CENTRIFUGAL. Hein, Lehmann & Co. A.G., P.O. Box 4109, Düsseldorf, Germany.

A new leaflet describes the Hein, Lehmann cone-type centrifugal in which a continuous stream of massecuite is fed to an acceleration chamber with solid walls. The speed of massecuite rises from theoretical zero at the centre reaching the required value at the start of the cone-shaped separating surface where it forms a thin layer from which the molasses can flow leaving crystals which pass up and over the rim of the cone.

* * *

MODERN SUGAR PRODUCTION WITH THE D.d.S. DIFFUSION. AB. De danske Sukkerfabrikker, Copenhagen, Denmark.

A new booklet gives a brief account of the Danish Sugar Corporation Ltd., and describes the advance of the D.d.S. diffuser which is now in operation or on order in Belgium, Canada, Denmark, England, Finland, France, Germany, Italy, Iran, Lebanon, Pakistan, Poland, Sweden, U.S.A., U.S.S.R. and Yugoslavia. The principles of the diffuser, its construction and automation, its economic advantages and its adaptability are discussed, and it is shown how the equipment produces high quality beet juice and pulp, corrosion is avoided, and low sugar losses are achieved with low draught. The D.d.S. diffuser is available in sizes ranging from 250 to 3600 tons per day, and is now available from seven licensees of the Danish Sugar Corporation.

Sugar Dryer for Bolivia.—A 5 ft dia. × 26 ft Standard-Hersey rotary sugar dryer and a Standard-Hersey rotary sugar cooler of the same size were recently shipped to Santa Cruz, Bolivia, by Standard Steel Corporation, Los Angeles, Calif., U.S.A. This equipment soon will be installed in the Gasser & Cia. Industrias "La Belgica" S.A. refinery in Santa Cruz. The dryer and cooler are a part of a $1·5 million expansion programme made possible by a loan from the Development Loan Fund in Washington, D.C. When the expansion is completed, Gasser & Cia. will have increased its grinding capacity from 350 tons per 24 hours to 1400 tons per 24 hours, quadrupling its sugar production.

FOR ALL TYPES OF MECHANICAL HANDLING EQUIPMENT

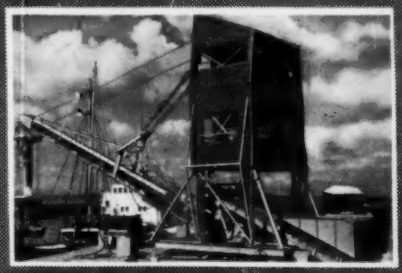
C & T LTD

Coal Screening Plant

Beaver (Bulk Stacker)

Meteor Thrower (Suspended)

Bagging Unit



A Crone & Taylor Bulk Cargo Loader & Thrower

Photograph by courtesy of Messrs. I.C.I. Ltd., Salt Division, Runcorn

Unit Conveyor (Overhead)

Walrus Stacker

This equipment handles up to 300 Tons of Cargo per hour and is a most effective method for handling Bulk Cargo materials such as coal, coke, gravel, sand, salt, chemicals, etc.

For modern Cargo Handling Equipment get in touch with

CRONE & TAYLOR (Engineering) Ltd.

St. Helens, Lancashire, England

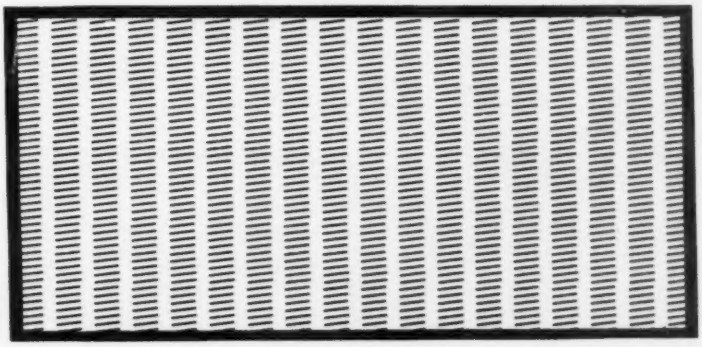
Tel.: St. Helens 3283

Keep More Sugar

in the Basket

with the Improved

FERGUSON



conical slot centrifugal screens

.011 Inches Wide on Inside Surface

.016 Inches Wide on Outside Surface

FERGUSON PERFORATING & WIRE CO.

Write for Our New Catalogue

130-140 Ernest Street

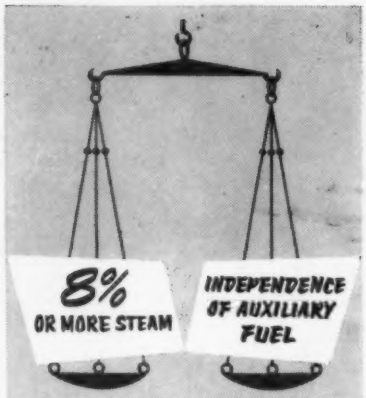
Providence 5, Rhode Island, U.S.A.

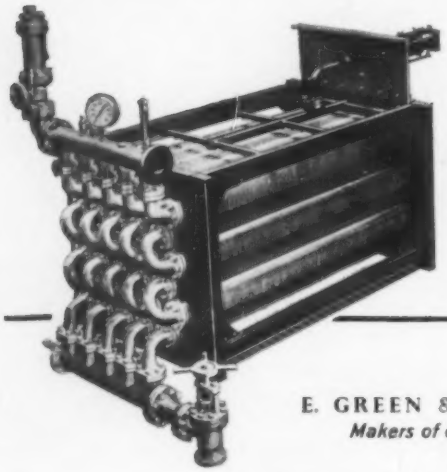
Agents—
Cuba—Iberia Machinery Co., P.O. Box 3408, Havana, Cuba.
Puerto Rico—William Munch, Inc., P.O. Box 1952, San Juan.
Mexico—Equipos Azucareros S.A., Balderas 36-Despacho 703, Mexico, D.F.
Brazil—Kropsch & Comp. Ltd., Rua Buenos Aires 81, 4° AND., Rio de Janeiro.
Hawaii—P. S. Pell & Co. Ltd., P.O. Box 1441, Honolulu 6.
Philippines—The Edward J. Nell Company, P.O. Box 612, Manila.
Argentina—Armando S. Villasuso, Muñecas 110, Tucuman.

Which do you need?

Much of the heat now lost in the boiler flue gases can be transferred to the boiler feed water by installing a 'GREEN'S ECONOMISER'. Every 10°F rise in feed water temperature saves 1% of fuel or gives an equivalent increase in steam production.

Sugar mills all over the world are already getting these benefits; why not you? Ask for full particulars of what can be done in *your* mills.



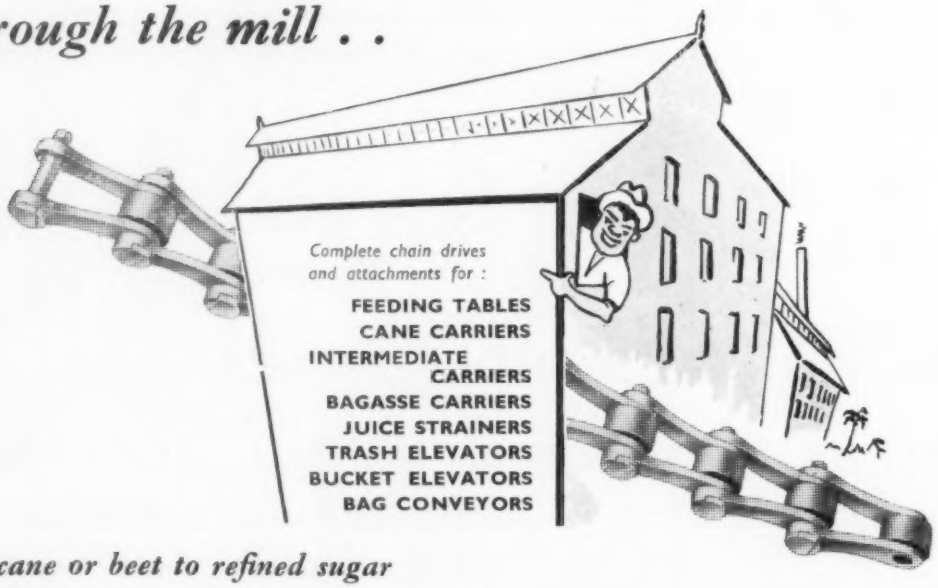


GREEN'S
ECONOMISER

E. GREEN & SON LTD WAKEFIELD · ENGLAND
Makers of economisers for more than one hundred years

GE. 167

Through the mill . .



Complete chain drives and attachments for :

FEEDING TABLES
CANE CARRIERS
INTERMEDIATE CARRIERS
BAGASSE CARRIERS
JUICE STRAINERS
TRASH ELEVATORS
BUCKET ELEVATORS
BAG CONVEYORS

from cane or beet to refined sugar production runs smoother on . .

Pennine chain

TOUGH MALLEABLE IRON—LONG WEARING
INTERCHANGEABLE WITH OTHER MAKES

Catalogues on request: PENNINE CHAINBELT CO. LTD., ARMLEY, LEEDS 12, ENGLAND

BREVITIES

New Indian Sugar Factory.[1]—The Indian Government is planning to erect a new sugar factory in Aska, in the state of Orissa, at a cost of 13½ million rupees.

* * *

New Sugar Factory in Syria.[2]—The second sugar factory in Syria started operation at Adra in July. Machinery and equipment was supplied by Czechoslovakia, and the factory can process 750 tons of beet or 150 tons of cane sugar per day.

* * *

Overproduction in Costa Rica.[3]—Faced with an export quota of 8498 tons under the International Sugar Agreement and a 1958/59 production of 46,650 tons—an increase of nearly 100% since 1950/51—the Sugar Cane Board has decided to place a ban on the increase of cane cultivation in order to cope with overproduction.

* * *

Beet Experiments in Hawaii.[4]—The sugar beet plots planted by Hawaiian Commercial & Sugar Co. in March have been harvested after 4·7 months and found to yield 26 tons per acre on average with a sugar content ranging from 12 to 15%. The experiments are continuing.

* * *

U.S. Domestic Quotas, 1959.[5]—The U.S. D. A., on 20th October, announced an increase of 100,000 tons in the estimate of domestic sugar requirements for 1959, increasing the quota from 9,300,000 short tons, raw value, to 9,400,000 tons. Domestic beet sugar producers were given 42,401 tons of this while Cuba received 29,141 tons and Mainland Cane 13,048 tons. The remainder, 15,410 tons, went to the full duty countries.

* * *

Bagasse Pressing in Hawaii.[6]—A press to dewater bagasse from the experimental diffuser was installed in September at Kekaha Sugar Company on Kauai. The moisture level of 87% should be taken down to about 45% and is expected to permit an increase in sugar recovery from the island average of 94% with the conventional sugar mill to over 98%. The press, built by the French Oil Mill Machinery Co. of Ohio, is designed to handle all the bagasse from the diffuser—about 17 tons per hour at present—and is about 10 ft long, 8 ft wide and 8 ft high.

* * *

U.S. Sugar Situation.[7]—Based on conditions prevailing on 1st September a record U.S. sugar beet crop of 16,305,000 short tons is now estimated. The estimated production of sugar cane for sugar and seed, at a record of 8,316,000 tons, is up about 3% from the estimate of the beginning of September. Conditions in Florida and Louisiana remain favourable for cane growth. Nevertheless the U.S. Dept. of Agriculture intends to permit U.S. sugar refiners to build up reserve inventories of imported raw sugar. This will partly be a precaution against a dock strike on the Atlantic and Gulf coasts.

* * *

Tate & Lyle Purchase of Canada & Dominion Sugar Co. Shares.—Tate & Lyle Ltd. made an offer towards the end of October of 25 Canadian dollars each for shares in Canada & Dominion Sugar Co. Ltd. and the directors of the latter company recommended acceptance. It was announced that a total of over a million shares had been tendered by the closing date of the offer on November 12th. Accordingly Tate & Lyle are taking up the maximum number which they offered to accept —676,435 shares, or 50% of the shares not already held by the Tate & Lyle Group. This brings the Tate & Lyle holding to just over 56%.

* * *

European Beet Sugar Production.—LICHT's first estimates of the European beet sugar crop were published in our November issue, but the unusual weather of this year's growing period has resulted in the necessity for a revised estimate in the Licht *International Sugar Report* of the 4th November[8]. Production is now expected to be 17,098,000 metric tons, raw value, or 100,000 tons more than a month before. The largest change is the anticipated addition of 189,000 tons to the Italian forecast, while other increases include 50,000 tons for Western Germany, 30,000 for Turkey, 25,000 for the U.K. and 20,000 for Yugoslavia. The estimate for France is lower by 67,000 tons and for Poland is 100,000 tons lower.

Bagasse Paper Experiments.[9]—The Indian Minister for Industry announced recently that eight tons of bagasse had been exported to Japan for experiments on the feasibility of newsprint manufacture from it.

* * *

Ghana Sugar Refinery Planned.[10]—Two Czech industrialists have recently arrived in Ghana to negotiate with the Ghana Industrial Development Corporation for erection of a new sugar refinery in Ghana.

* * *

Cuba-Ceylon Trade Agreement.[11]—Under a trade agreement signed in August, Ceylon is to buy 20,000 tons of Cuban sugar before the end of 1959 and Cuba is to use 60% of the proceeds for the purchase of Ceylonese products.

* * *

Italy Sugar Expansion.[12]—The "Eridania" sugar group which already operates a factory in Sardinia has decided to erect a second on the island of double the capacity of the first. This will require a considerable increase in the area devoted to beet growing.

* * *

New Indian Cane Research Station[13].—The Government of Andhra Pradesh have sanctioned a scheme for the establishment of a sugar research sub-station at Chittoor, the costs of which will be shared between the State Government and the Indian Central Sugarcane Committee.

* * *

Sugar Refinery for Thailand[14].—Bids for construction of a sugar refinery of 20 tons capacity were invited in October by the Thai Sugar Organization. The project was to include construction of the buildings and warehouses, supply and installation of equipment and initial operation of the plant and training of local personnel.

* * *

Furfural from Bagasse.—It is reported[15] that the National Sugar Institute, Kanpur, is working on a different process for the manufacture of furfural from bagasse intended to eliminate the use of sulphuric acid, and results are said to be "encouraging". It is hoped that, should a successful process be developed, nylon production could be increased so as to meet the home demand and leave an exportable surplus.

Australian Sugar Exports 1956-58[16]

(*In metric tons, tel quel*)

Destination:	1958	1957	1956
Canada	114,826	119,566	109,931
Ceylon	—	17,323	24,269
Hong Kong	40,525	22,541	33,711
Japan	127,749	120,004	38,961
Malaya	—	1,013	5,584
New Zealand	75,853	80,501	63,568
United Kingdom	302,531	419,839	408,891
Total	661,484	780,787	684,915

[1] F. O. LICHT, *International Sugar Report*, 1959, **91**, (Supp. 18), 245.
[2] *Zeitsch. Zuckerind.*, 1959, **84**, 471.
[3] *Willett & Gray*, 1959, **83**, 397.
[4] *Sugar News* (Hawaii), 1959, **9**, (8), 2.
[5] *Lamborn*, 1959, **37**, 201.
[6] *Sugar News* (Hawaii), 1959, **9**, (8), 4.
[7] F. O. LICHT, *International Sugar Report*, 1959, **91**, (Supp. 19), 258.
[8] 1959, **91**, (10), 93.
[9] *Indian Sugar*, 1959, **9**, 257.
[10] F. O. LICHT, *International Sugar Report*, 1959, **91**, (Supp. 18), 245.
[11] *Foreign Crops & Markets*, 31st August, 1959.
[12] *Zeitsch. Zuckerind.*, 1959, **84**, 527.
[13] *Indian Sugar*, 1959, **9**, 257.
[14] *Willett & Gray*, 1959, **83**, 416.
[15] *Indian Trade J.*, 1959, **209**, 761.
[16] *Lamborn*, 1959, **37**, 209.

BREVITIES

New Turkish Sugar Factory.[1]—At the end of August, the new sugar factory at Susurluk near Balikesir began its first campaign in which it should slice about 250,000 tons of beet.

* * *

Taiwan Sugar Production, 1958/59[2].—Production for the 1958/59 season is reported at 970,793 metric tons as against 929,239 tons last year.

* * *

Molasses Transport in Rhodesia[3].—Rhodesia Railways have introduced portable 650-gallon tanks to transport molasses from Triangle Sugar Estates via Mbizi and some 500,000 gallons may be handled in this fashion by the end of the year.

* * *

Sugar Cane Experiments in Northern Rhodesia[4].—High grade sugar cane with a 12·16% sugar content is being grown experimentally on a farm near Mazabuka, but with sugar estates and refineries in Southern Rhodesia meeting the Federal demand, the Federal Government has declined to encourage Northern Rhodesian farmers to grow sugar cane.

* * *

Sugar Refinery for Angola[5].—A sugar refinery is projected for Luanda, Portuguese West Africa, with local capital—reportedly $2·8 million. The plant, to be situated near Muxima, will employ among others about 100 Europeans. It is expected to produce 40,000 tons of sugar a year. The company will grow its own cane and will obtain electric power from the Cambambe River hydro-electric plant now under construction.

Stock Exchange Quotations

CLOSING MIDDLE

London Stocks (*at 18th November*, 1959)	
Anglo-Ceylon (5s)	19/3
Antigua Sugar Factory (£1)	16/0
Booker Bros. (10s)	29/6
British Sugar Corp. Ltd. (£1)	25/6
Caroni Ord. (2s)	4/7½
Caroni 6% Cum. Pref. (£1)	19/–
Distillers Co. Ltd. (6s. 8d. units)	34/3
Gledhow Chaka's Kraal £1)	63/–
Hulett & Sons (£1)	79/–
Jamaica Sugar Estates Ltd. (5s units)	10/–
Leach's Argentine (10s units)	13/–
Reynolds Bros. (£1)	62/–
St. Kitts (London) Ltd. (£1)	66/3
Ste. Madeleine (Ord.) (£1)	29/–
Sena Sugar Estates Ltd. (10s)	36/3
Tate & Lyle Ltd. (£1)	58/–
Tate & Lyle Investments Ltd. (5s)	18/3
Trinidad Sugar (5s stock units)	25/9
United Molasses (10s stock units)	41/–
West Indies Sugar Co. Ltd. (£1)	21/3

CLOSING MIDDLE

New York Stocks (*at 17th November* 1959)	$
American Crystal ($10)	41⅛
Amer. Sugar Ref. Co. ($100)	27⅝
Central Aguirre ($5)	24
Cuban American ($10)	18¾
Great Western Sugar Co.	30⅛
South P.R. Sugar Co.	20
United Fruit Co.	24¼
West Indies Sugar Corp. ($1)	38½

Mexican Sugar Production, 1958/59[6].—Sugar production in Mexico in 1958/59 amounted to 1,261,721 metric tons compared with 1,120,628 tons the previous season. Production in Mexico is usually about 99% in the form of whites whilst a further 80,000 tons of low-grade white sugar is normally produced by primitive methods.

* * *

Indian Cane Area 1959/60[7].—The first estimate of the cane area for the 1959/60 crop in India has been put at 4,920,000 acres as compared with the latest figure of 4,804,000 acres for the previous season. The estimate covers about 95% of the area sown and reflects the position at the end of June when the crop was reported to be satisfactory. Increases in acreage were mainly found in Bihar, Punjab and Uttar Pradesh.

* * *

Honduras Sugar Production[8].—Sugar production in Honduras is expanding. Total output in 1954 amounted to 6431 long tons according to the Bank of London & South America. By 1958 this had risen to 12,533 tons whilst this year it is estimated that about 14,866 tons will be produced, sufficient to meet about 65% of domestic requirements.

* * *

Sugar and Paper Industry Plans for Uruguay[9].—Dutch technicians have examined the possibility of the growing of sugar cane and erection of sugar factories in the Uruguayan department of Artigas. The erection of a sugar factory with an annual capacity of 24,000 tons of sugar could be connected with that of a factory for newsprint which might produce 8000 tons a year; these are about one quarter of the annual sugar and newsprint consumption in Uruguay. Self-sufficiency in sugar would help the country save 200 million pesos.

* * *

South African Sugar Industry Valuation[10].—The total value of the sugar industry in Natal and Zululand is now £113,000,000, according to a report recently published by Doornkop Sugar and Food Industries Ltd. A survey of all sugar mills at present operating indicated that the combined replacement value of assets exceeded £43,000,000 and that the value of the land and cane crop today is about £70,000,000.

* * *

Japan Sugar Expansion[11].—Figures have been released of estimated sugar production in the Ryukyu islands during the year July 1959/June 1960 and the targets for the following five years, as follows:—

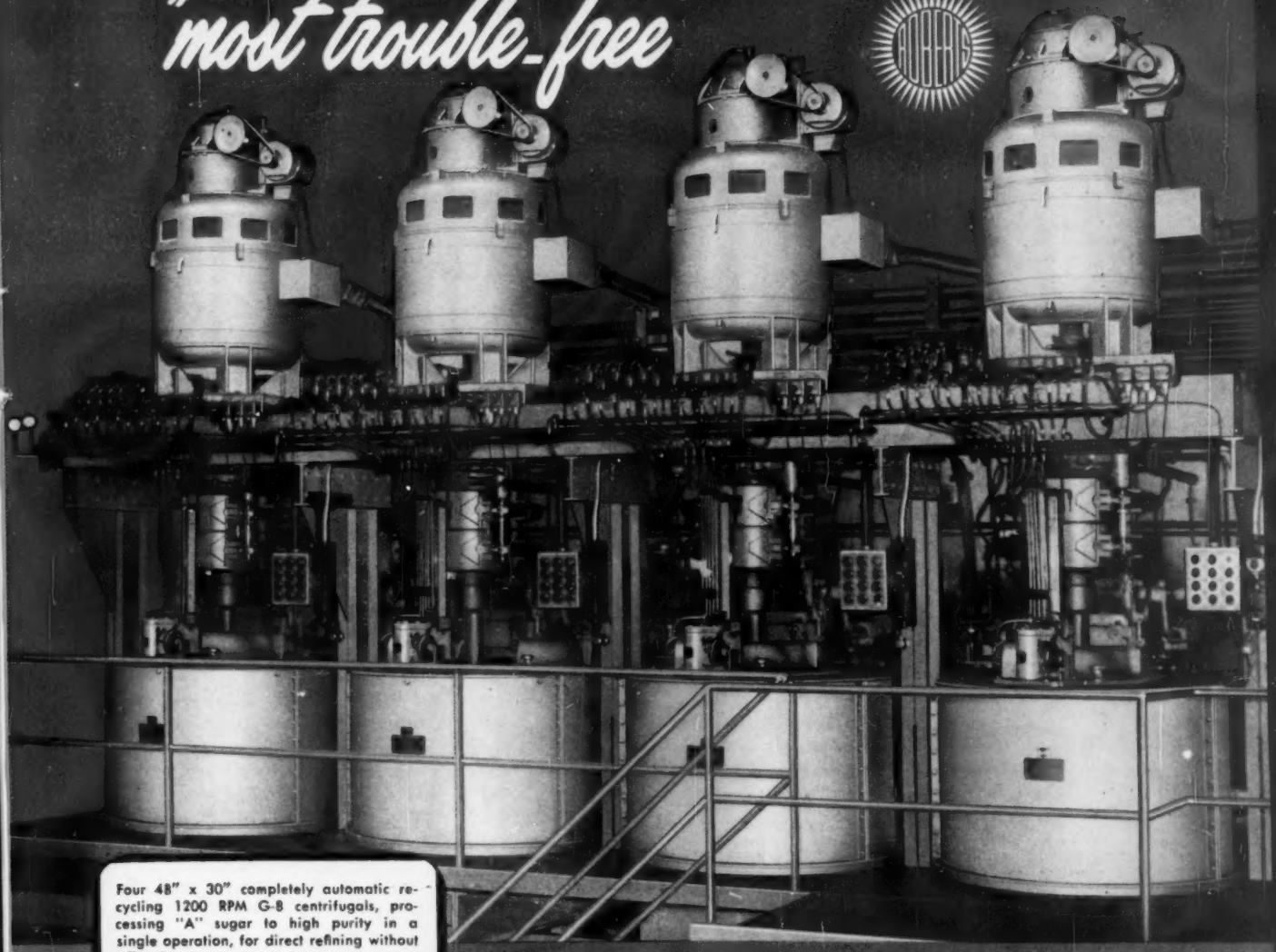
	Centrifugal	*Non-centrifugal*	*Total*
1959/60	26,235	37,065	63,840
1960/61	36,467	36,324	72,791
1961/62	49,354	34,200	83,554
1962/63	59,685	33,000	92,685
1963/64	69,236	31,500	100,736
1964/65	75,480	30,720	106,200

* * *

Ste. Madeleine Sugar Co. Ltd. 1958/59 Report.—The quantity of sugar produced, at 65,982 tons, was about the same as in 1958 (66,622) but earnings were less. This resulted primarily from two causes—first, the yield of sugar was reduced by almost ½-ton per acre by Trinidad's worst drought in 40 years and this led to an increase in cost. Second, the year was a bad one for insect pests and the costs of their control rose by over £1 per ton of sugar on Estate cane. It is proposed to increase the grinding rate of the mills and to replace an old mill at a cost of £400,000. It seems likely that the 1960 sugar crop will be lower than 1959 because of the severe drought which only broke in October.

[1] *Zeitsch. Zuckerind.*, 1959, **84**, 528.
[2] F. O. Licht, *International Sugar Report*, 1959, **91**, (Supp. 20), 273.
[3] *Overseas Review* (Barclays D.C.O.), October 1959, 29.
[4] *Overseas Review* (Barclays D.C.O.), November 1959, 25.
[5] *Willett & Gray*, 1959, **83**, 429.
[6] *Bol. Azuc. Mex.*; through C. Czarnikow Ltd., *Sugar Review*, 1959, (430), 184.
[7] C. Czarnikow Ltd., *Sugar Review*, 1959, (429), 178.
[8] C. Czarnikow Ltd., *Sugar Review*, 1959, (427), 171.
[9] F. O. Licht, *International Sugar Report*, 1959, **91**, (10), 100
[10] *Travers' Circular*, 1959, (642), 143.
[11] C. Czarnikow Ltd., *Sugar Review*, 1959, (427), 170.

"most trouble-free"



Four 48" x 30" completely automatic recycling 1200 RPM G-8 centrifugals, processing "A" sugar to high purity in a single operation, for direct refining without affination.

2861

declares

CIA. AZUCARERA DE LOS MOCHIS, S.A.

Sinaloa, Mexico

In 1924 the first Roberts equipment was supplied to the United Sugar Companies S.A. (predecessor of the present firm.) Since then, they have purchased 26 Roberts Centrifugals. Such loyalty is an inspiration to us. It indicates confidence born of profitable experience. Mr. John Steel, Vice President, writes as follows of their experience with the machines shown here:

"Your four G-8's have been running now for nearly six months and we are pleased to inform you that they are the most trouble-free equipment we ever bought for our sugar factory. We just don't know they are there. Cutting raw sugar for 2,100 metric tons refined per week they are away over capacity."

Our aim is to merit Los Mochis' continued confidence and that of all of our customers.

THE WESTERN STATES MACHINE COMPANY

HAMILTON • OHIO • U.S.A.

TO KEEP THE LEAD . . . WE THINK AHEAD

Index to Advertisers

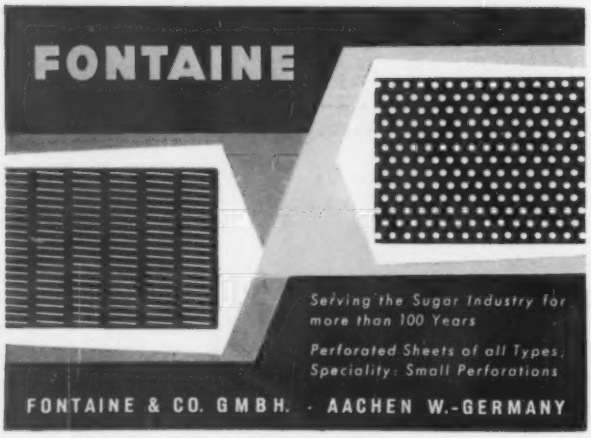
	PAGE
Ashworth & Parker Ltd.	l
F. W. Berk & Co. Ltd.	li
Blairs Ltd.	Inside Front Cover, xxxi
Braunschweigische Maschinenbauanstalt	xxxvi
Brecknell, Dolman & Rogers Ltd.	xl
Thomas Broadbent & Sons Ltd.	i
Broussard Machine Co.	lvii
David Brown Corp. (Sales) Ltd.	xxii
Buckau R. Wolf A.G.	v
Cary Iron Works	lii
CECA	li
George Clark & Son (Hull) Ltd.	vi
Clydesdale Chemical Co. Ltd.	lvii
Cochran & Co., Annan, Ltd.	xlv
Cocksedge & Co. Ltd.	xli
Geo. Cohen, Son & Co. Ltd.	l
A. F. Craig & Co. Ltd.	xxvi
Crofts (Engineers) Ltd.	xlii
Crone & Taylor (Engineering) Ltd.	liii
Dorr-Oliver Inc.	Inside Back Cover
Dunford & Elliott Process Engineering Ltd.	xx
Electromagnets Ltd.	lix
Ericsson Telephones Ltd.	xxi
Escher Wyss Ltd.	vii
Evershed & Vignoles Ltd.	ii
Ewart Chainbelt Co. Ltd.	lvi
Ferguson Perforating & Wire Co.	liii
Soc. Fives Lille—Cail	viii
George Fletcher & Co. Ltd.	Outside Back Cover
Flexible Drives (*Gilmans*) Ltd.	xlviii
Fontaine & Co.	lvi
Goka N.V.	lx
E. Green & Son Ltd.	liv
Grill Floors Ltd.	xviii
Gruendler Crusher & Pulveriser Co.	xiii

	PAGE
Hein, Lehmann & Co. A.G.	xix
N. A. Helmer	lvi
Fr. Hesser Maschinenfabrik A.G.	xxiv
Hilger & Watts Ltd.	xliii
Honolulu Iron Works Company	lviii
Horsleley Bridge & Thomas Piggott Ltd.	xxxix
Robert Hudson Ltd.	lx
Johns-Manville International Corp.	xlix
Kleen-e-zee Brush Co. Ltd.	lx
John McNeil & Co. Ltd.	xxx
Marshall, Sons & Co. Ltd.	xxix
E. C. Masson	lvi
Mirrlees Watson Co. Ltd.	iii, xliv
Norit	xlvi
Paterson Engineering Co. Ltd.	xlvii
Pennine Chainbelt Co. Ltd.	liv
Pott, Cassels & Williamson Ltd.	xxxiv
Ransomes, Sims & Jefferies Ltd.	xii
Rotameter Mfg. Co. Ltd.	xxiii
Sackfilling & Sewing Machine Syndicate Ltd.	iv
Salzgitter Industriebau G.mb.H.	ix
Saunders Valve Co. Ltd.	xvi
Richard Simon & Sons Ltd.	lviii
A. & W. Smith & Co. Ltd.	xxxii, xxxiii
S.P.E.I. Chim	lii
Spencer (Melksham) Ltd.	xvii
Squier Corporation	xxxv
Duncan Stewart & Co. Ltd.	xxxvii
Stork-Werkspoor N.V.	xi
Suchar Sales Corporation	xxxviii
Sugar Manufacturers' Supply Co. Ltd.	lix, lxii
Technoexport	x
Watson Laidlaw & Co. Ltd.	xxviii
Western States Machine Co.	lv
Whitlock Brothers Ltd	xiv
Yorkshire Imperial Metals Ltd.	xv

FOR BUYERS' GUIDE SEE JULY ISSUE pp. xlv-lviii

SMALL ADVERTISEMENT RATES.

Forty words or under—£1. 5s. 0d. sterling or U.S. $3.50, prepaid. Each additional six words or part thereof—4s. 0d. or U.S. $0.60. Box Number—charged as six words.


FONTAINE
Serving the Sugar Industry for more than 100 Years
Perforated Sheets of all Types;
Speciality: Small Perforations
FONTAINE & CO. GMBH. · AACHEN W.-GERMANY

E. C. MASSON Member A.S.M.E.
CONSULTING ENGINEER
CANE SUGAR MILLS & REFINERIES
Engineering & Construction — Improvements & Expansion
FACTORY AUTOMATION
P.O. Box 1728 MIAMI 10, FLORIDA Telephone:
Cables: NOSSAM U.S.A. Highland 3-3025

N. A. HELMER
Member A.S.M.E.
CONSULTING ENGINEER
Representing
The Mirrlees Watson Company Limited, Glasgow, Scotland
Pott, Cassels & Williamson Limited, Motherwell, Scotland
POST OFFICE BOX 54—PLAINFIELD, N.J., U.S.A.

FOR SALE

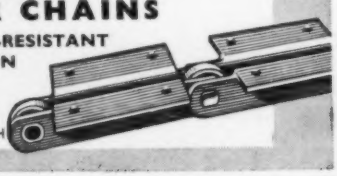
As a result of an expansion programme the following sugar mill drives will be available for sale in January, 1960.

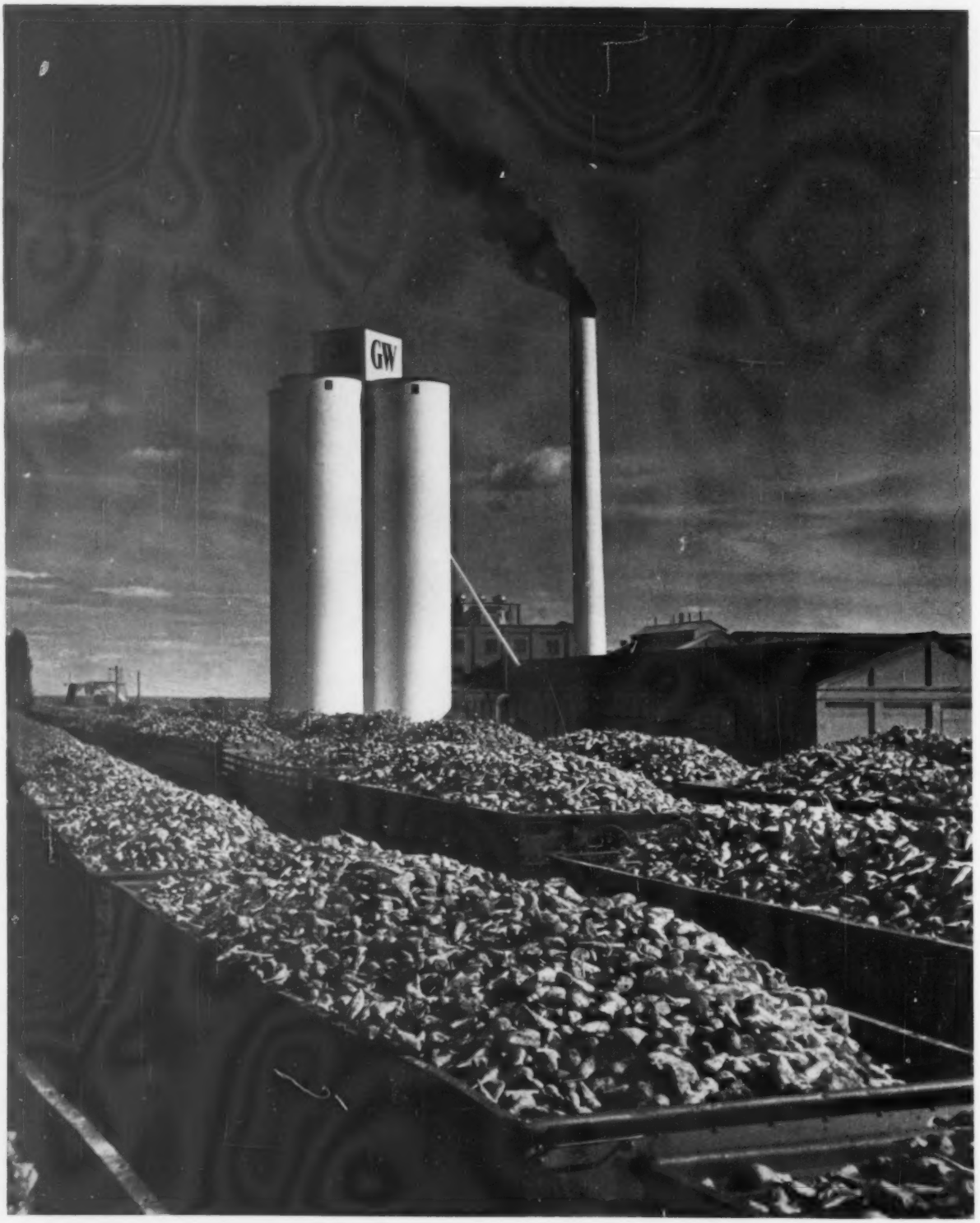
A. One 200 h.p. *Murray* steam turbine complete with *Farrell* gearbox, all in perfect condition.

B. One 22 in. × 36 in. and two 24 in. × 48 in. horizontal piston valve steam engines, complete with flywheel, all in good condition.

To obtain further information please contact :
The General Manager, Doornkop Sugar & Food Industries, P.O. Doringkop, Natal, South Africa.

EWART CHAINBELT COMPANY LTD. DERBY · ENGLAND
CARRIER CHAINS
IN CORROSION-RESISTANT MALLEABLE IRON
STEEL CHAINS UP TO 140,000 LB. BREAKING STRENGTH





LOVELAND SUGAR FACTORY, COLORADO

SUGAR CANE LOADERS

Broussard Flex-boom hydraulic Loader mounted on Fordson-Major tractor equipped with Manuel 4-wheel drive, loading 80 ton per acre cane in Puerto Rico.

Capacity 2000 lb/minute (under Louisiana conditions) grab capacity (54 in. opening) 1500 lb., load clearance 12 ft., loading radius 10 ft. to 12 ft., boom swing front to right 100°.
The Broussard Heavy Duty tropical type loader is now available for installation on the Caterpillar D-4, International TD-6, Track-Marshall, John Deere 440 crawler and various USA wheel tractors.
It may be easily installed at the destination on tractors already in hand and quickly removed from the tractor at the close of the harvest.

Manufactured by
BROUSSARD MACHINE COMPANY
ST. MARTINVILLE, LOUISIANA

Export Division
LOGAN PERKINS—SUGAR MACHINERY
International Trade Mart, New Orleans, U.S.A.

"Ditmar" Transmission Boiling Recorder

Excerpt from letter:

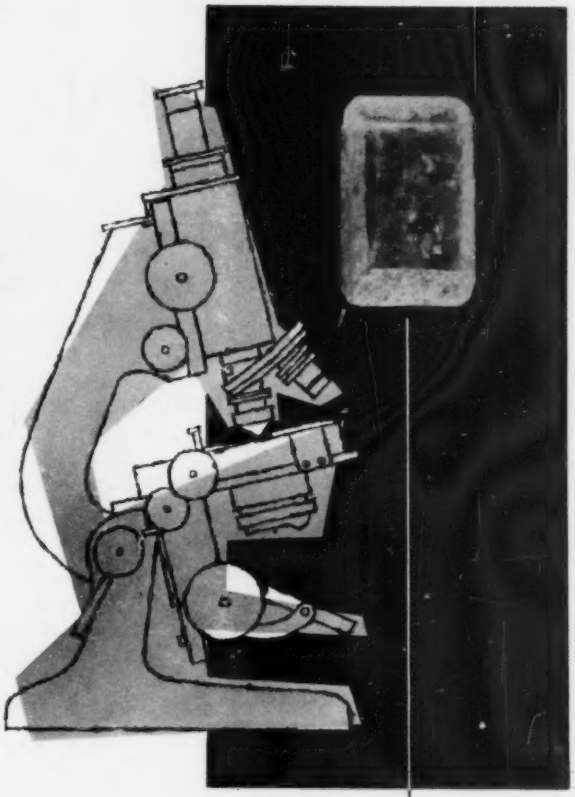
"The favourable results which we have obtained during this campaign with the 'DITMAR' recorder have shown to those, who have made its acquaintance, the undeniable advantages the apparatus possesses."

DITMAR ZONEN N.V. NAARDEN HOLLAND.

CHIEF ENGINEER required for Latin American Sugar Factory. Experienced applicants only considered. Knowledge of Spanish desirable. Application, References etc. to Box No. 408, *The International Sugar Journal Ltd.*

ASSISTANT SUGAR FACTORY ENGINEER required for the Carribean Area. Previous Experience Desirable. Applications, References etc. to Box. No. 409, *The International Sugar Journal Ltd.*

WANTED for a large Sugar Factory, East Africa, Chief Engineer fully qualified, experienced in Lay-out, erection, modernisation and efficient running. Excellent prospects. Apply with full details stating salary expected and a copy of photograph. Apply Box No. 410, *The International Sugar Journal Ltd.*



it's

CRYSTAL CLEAR...

that Actibon Decolourising Carbon must be **your** first choice for economical and efficient colour removal.

Actibon has been specially developed to meet the needs of the Sugar Industry.

ACTIBON

the highly activated Decolourising Carbon

THE CLYDESDALE CHEMICAL CO. LTD.

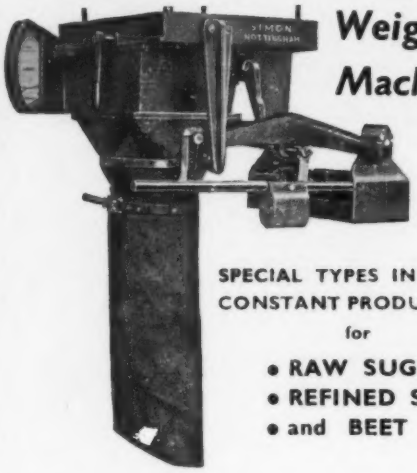
SALES OFFICE
142 QUEEN STREET · GLASGOW C.1
Phone: CENtral 5247-8 *Grams: "Cactus" Glasgow*

CONTINUOUS BELT WEIGHER

for weighing whole beets or cossettes

Specially adapted for controlling the speed of cutting mills relative to weight for Continuous Diffusion Plants

Automatic and Sackfilling Weighing Machines



SPECIAL TYPES IN CONSTANT PRODUCTION for

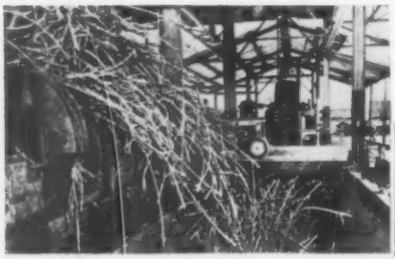
- RAW SUGAR
- REFINED SUGAR
- and BEET PULP

RICHARD SIMON & SONS LTD.

PHOENIX WORKS, BASFORD, NOTTINGHAM

Telephone: 75136-7-8 *Telegrams:* "Balance, Nottingham"

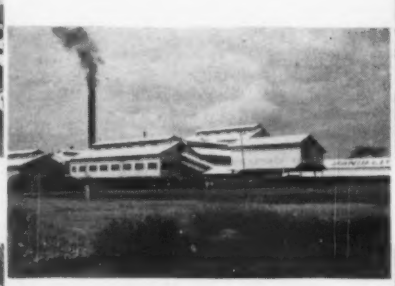
HONIRON



Cane Knives—Carriers—Feeder Tables

Evaporators — Condensers

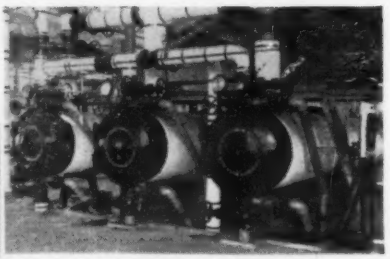
— FOR —



SUGAR FACTORIES
DISTILLERIES — REFINERIES

REPORTS AND STEAM BALANCE INVESTIGATIONS

SALES REPRESENTATIVES FOR WERKSPOOR RAPID CRYSTALLIZERS



Juice Heaters

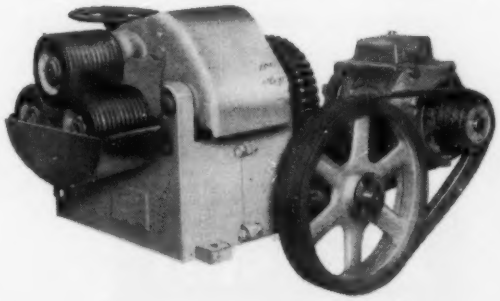
Hamill Lowhead Vacuum Pans

HONOLULU IRON WORKS COMPANY

HONOLULU, HAWAII • HILO, HAWAII • MANILA, PHILIPPINES
165 BROADWAY, NEW YORK 6, N. Y.
Cable Address: HONIRON, NEW YORK

A Suma Product

Improved ROLEX MILL



The illustration shows a ROLEX mill belt-driven by a 3 h.p. electric motor.

The **ROLEX** laboratory three-roller cane mill has recently been improved. The 5" x 5" rolls and body are now in Meehanite cast iron and the spur gears are of steel. Otherwise the general lay-out is as formerly. The top roll is adjustable, oilite bearings fitted, and 20:1 gear ratio. Scrapers are also fitted to both bottom rolls. The juice tray and scrapers are removable for general cleaning.

For further information, see page 26 of the Suma catalogue, which will be sent on request.

The Sugar Manufacturers' Supply Co. Ltd.

7 & 8, IDOL LANE, LONDON, E.C.3, ENGLAND.

Cables : "Sumasuco, London."

We have sold our patented

SUGAR TABLET OR CUBE INSTALLATIONS

all over the world.

Cubes from dry granulated

The small machine with the big output!

Very low capital outlay

Send for information to:

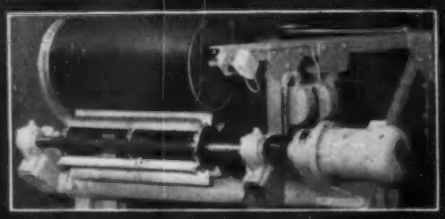
GOKA N.V.
MACHINE WORKS
Established 20 years
AMSTERDAM
HOLLAND
P.O. Box No. 130
Tel: 222255–222256

The Famous Kez - Strip Conveyor Belt Brush

Now -

complete in combination with our K·A·M UNIT

Prov. Pat. No. 33785 Regd. Trade Mark 761901



Showing the Unit in position ready for action. Micro-adjustable. Flameproof. Anti-static features can be incorporated. Little, if any, guarding required.

INDUSTRIAL DIVISION
THE Kleen-e-ze BRUSH CO. LTD
HANHAM · BRISTOL

Pioneering in CANADA...

New tunnels and mines are leading even further into the heart of Canada's mineral wealth. New techniques, saving time on construction, maintenance and replacement are helping to develop this vast country faster than ever before. In Canada, as in many other lands, Hudson's constantly give and gain experience to the benefit of light railway equipment in every sphere.

Hudson
LIGHT RAILWAY MATERIALS

ROBERT HUDSON LTD.,
RALETRUX HOUSE, MEADOW LANE, LEEDS
Telephone: Leeds 20004.
Telegrams: Raletrux, Leeds.

LONDON OFFICE: 30-34, BUCKINGHAM GATE, WESTMINSTER, LONDON, S.W.1 WORKS AT LEEDS, BENONI, DURBAN AND CALCUTTA

"Brasil Açucareiro"

OFFICIAL ORGAN *of the* BRAZILIAN INSTITUTE OF SUGAR & ALCOHOL
(INSTITUTO DO AÇÚCAR E DO ÁLCOOL)

A MONTHLY MAGAZINE containing complete news and specialized contributions on Brazilian and international sugar agriculture and industry.

Annual Subscription :

Brazil ..... Cr.$100.00
Foreign Countries ..... Cr.$150.00
Single Copies ..... Cr. $10.00
Back Copies ..... Cr.$15.00

Remittances must be made in the name of
INSTITUTO DO AÇÚCAR E DO ALCOOL
Praça 15 de Novembro, 42,
Rio de Janeiro,
BRASIL.
Caixa Postal, 420.

THE SOUTH AFRICAN SUGAR JOURNAL

covering the

Sugar Industries of NATAL, ZULULAND, MOZAMBIQUE and EAST AFRICA

Since 1914

The *South African Sugar Journal* has presented planters and millers in the territories for which it caters with authoritative reviews of developments in all fields of sugar cane technology.

FREE SAMPLE COPY SENT ON REQUEST

Subscription and Advertising Rates available from

THE SOUTH AFRICAN SUGAR JOURNAL
P.O. Box 1209
London Assurance House, Smith Street, Durban, South Africa.
Telephone 25612

SUGAR NEWS

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE PHILIPPINE SUGAR INDUSTRY

Published by :
THE SUGAR NEWS PRESS INC.

FEATURES

Results of research and experiments in fields and mills, and other important developments in the Philippine sugar industry of interest both to technical men and laymen ; sugar production, prices, and market news and statistics ; write-ups on other important and allied industries in the Philippines, etc.

SUBSCRIPTION

$7.50 U.S. Currency, per annum, post free *for U.S.A. and its possessions*

$10.00 U.S. Currency, per annum, post free *for other foreign countries*

WRITE FOR A FREE SPECIMEN COPY AND FOR ADVERTISING RATES.

Publishing Office :
417 Dasmariñas, 316 Doña Salud Building, Manila, Philippines.

CUBA SUGAR YEAR BOOK

New Edition (Spanish-English) containing SUGAR CENSUS corrected to date, informative data and alphabetical index of Sugar Mills, giving situation, ownership, year founded, nationality, characteristics, total employees, yield (%), total cane ground, production and export of sugar, molasses, syrups, alcohol, cane brandy, aguardiente, rum.

Also lands owned and leased, colonos, days grinding, record and maps of rainfall, price of sugar and value of crops. Maps of Cuba showing ports, landings, distances, railways, roads, air communications, telegraph, cable and telephone connexions. Graphs with cane and cane products data. Bonded warehouses, taxes, and legislative measures enacted touching the industry.

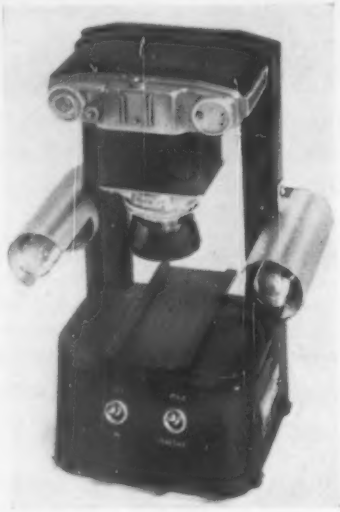
Directories with over 3000 names and addresses of official and private organizations, business firms, cane growers (Colonos), department heads, producers, shippers, etc.

Foreign Section : Sugar production in U.S. and other countries (beet and cane). Imports and distribution of sugar and by-products in U.S. World demand and consumption, quotas, distribution, transport, etc.

$5 post paid

Edited by :
CUBA ECONOMICA Y FINANCIERA
POST OFFICE BOX 2549, HAVANA, CUBA
Teleph. M-3148 Lonja 441-442

A Suma Product



THE

CRYSTAL CAMERA

Samples of sugar and massecuites from each strike can now be quickly and simply photographed as a routine control measure. The individual crystals are recorded exactly at their original size on a high-definition fine-grain 35 mm. negative, which can be enlarged or projected as desired.

The Sugar Manufacturers' Supply Co. Ltd.

7 & 8, IDOL LANE, LONDON, E.C.3, ENGLAND.

Cables: "Sumasuco, London."

I.S.J. BINDING CASES

Fixed in an Instant

Practical and Durable

Price: 21s. 6d.
or U.S. $3·00
per annual binding
(including packing and postage)

Bind your loose issues of the *I.S.J.* month by month as received. In this case they will open flat to any page. Green covers, gold lettering *"International Sugar Journal"* and the year if desired.

Please state in your order whether the year is to be included.

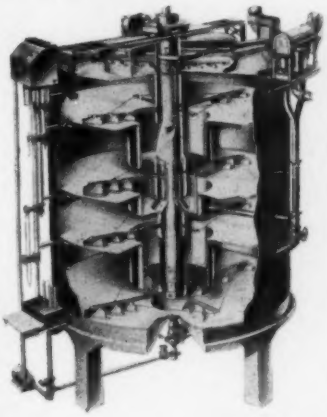
THE INTERNATIONAL SUGAR JOURNAL, LTD.
Central Chambers, The Broadway, London, W.5. (England)

For Efficient, Economical Sugar Manufacture

RapiDorr Clarifiers

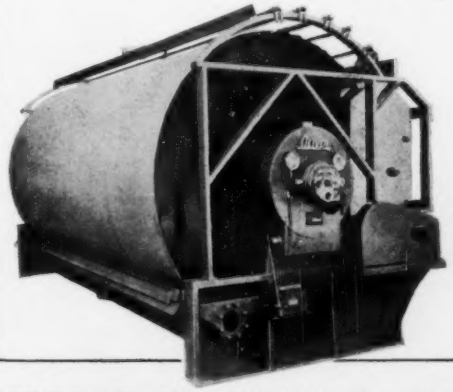
The RapiDorr Clarifier is a *high capacity* unit that allows faster processing of hot thin juice with consequent reduction in losses. It handles equivalent tonnages and achieves comparable results with *30% less volume*. The RapiDorr Clarifier design can be applied to existing units and working capacity can be *greatly increased* at moderate cost. Bulletin No. 4092 gives the complete story.

Write for your copy.



Oliver-Campbell Cane Mud Filters

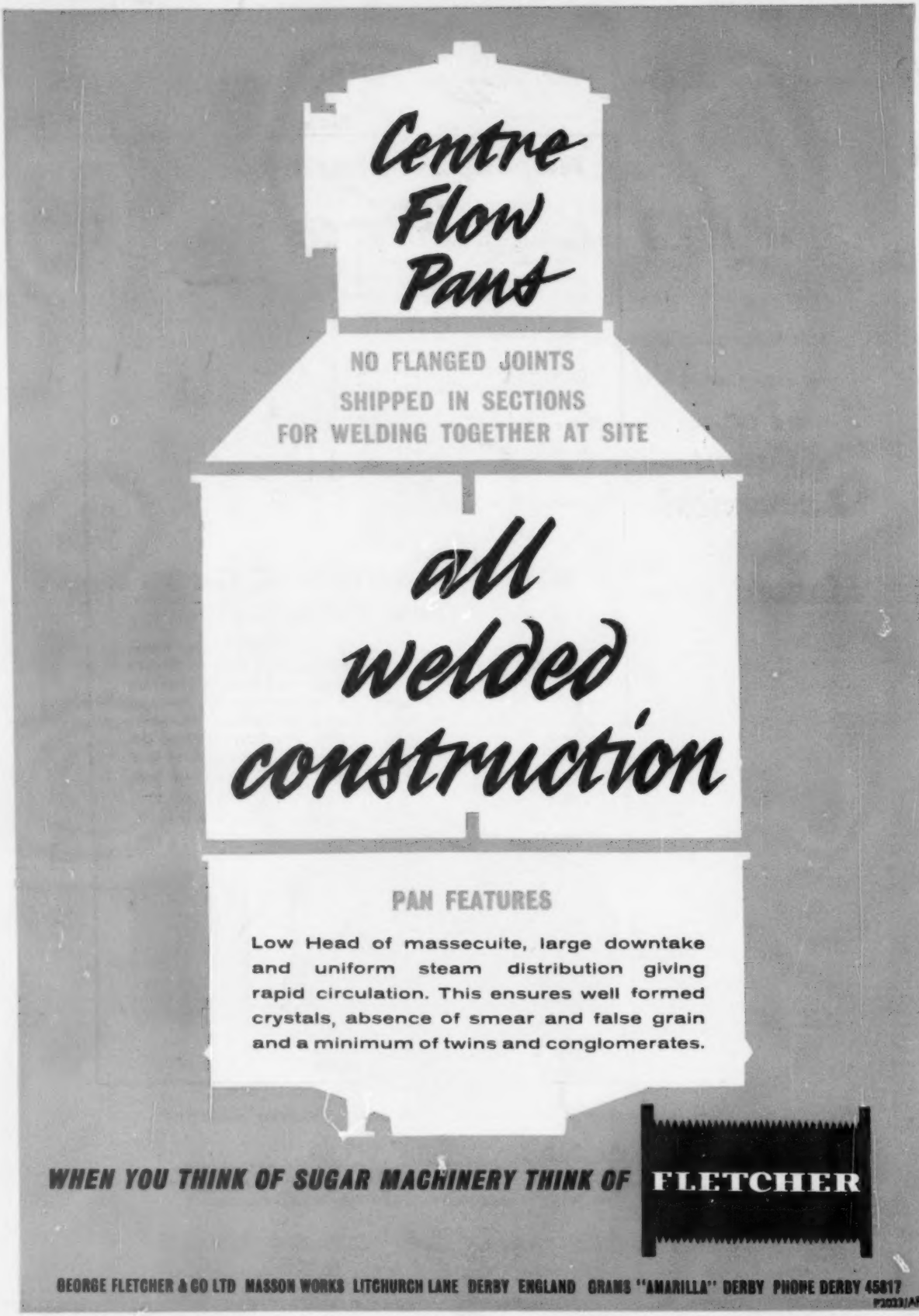
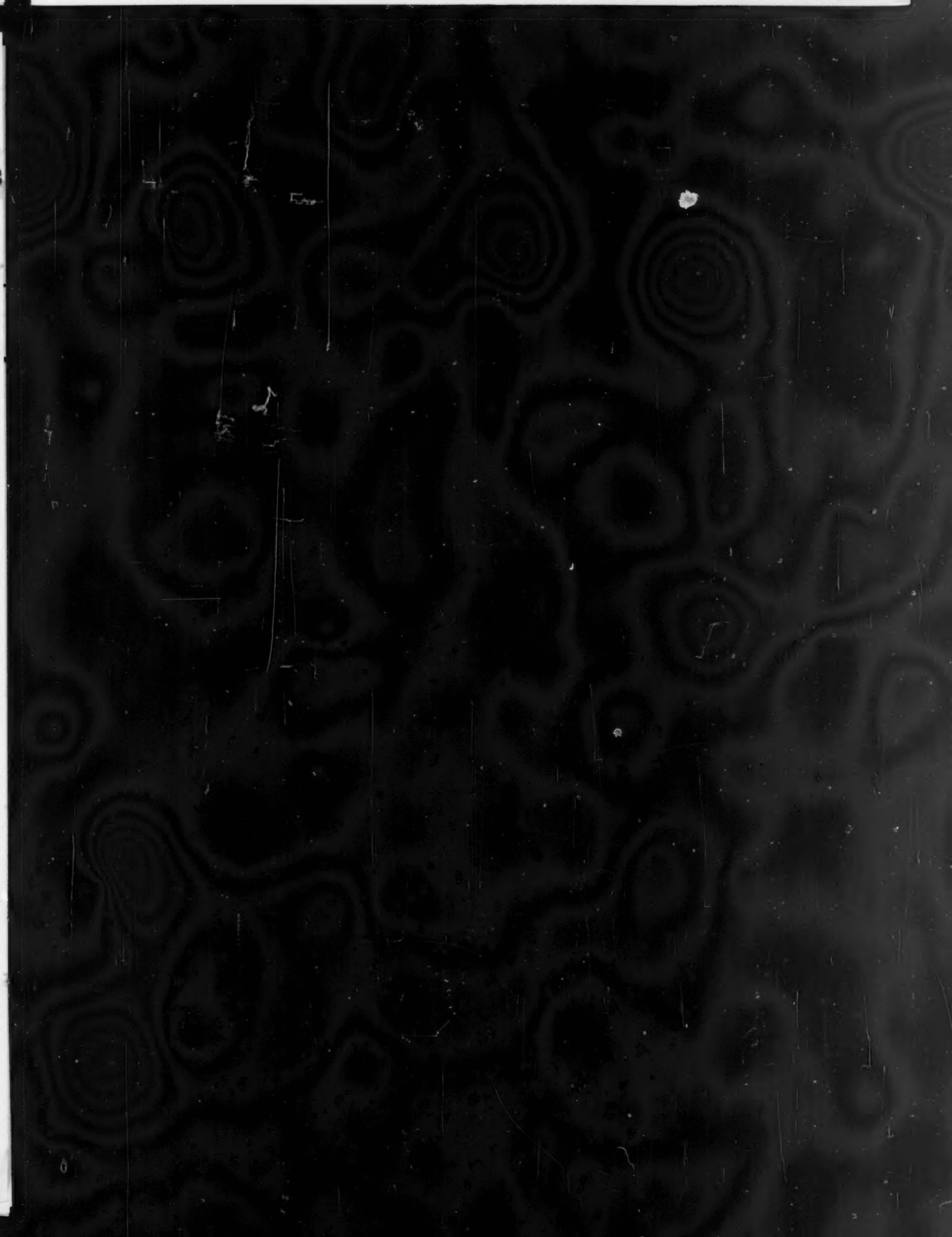
Designed for long life and economical operation, Oliver-Campbell Filters incorporate the latest filtration developments resulting in efficient, low cost cane mud washing. Operating advantages include — less inversion of sucrose and less re-solution of impurities, higher purity filtrate, cleaner, more compact filtration station and accurate accounting of sucrose recovery. Hundreds of Oliver-Campbell Filters are used throughout the world. Bulletin No. 4093 gives the complete story. Write for your copy.



CANE SUGAR DIVISION • DORR-OLIVER INCORPORATED • STAMFORD, CONNECTICUT

DORR-OLIVER

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT


Centre Flow Pans
NO FLANGED JOINTS
SHIPPED IN SECTIONS
FOR WELDING TOGETHER AT SITE
all welded construction
PAN FEATURES
Low Head of massecuite, large downtake and uniform steam distribution giving rapid circulation. This ensures well formed crystals, absence of smear and false grain and a minimum of twins and conglomerates.
WHEN YOU THINK OF SUGAR MACHINERY THINK OF
FLETCHER
GEORGE FLETCHER & CO LTD MASSON WORKS LITCHURCH LANE DERBY ENGLAND GRAMS "AMARILLA" DERBY PHONE DERBY 45817
P3023/AF

Printed by JOHN ROBERTS & SONS, Salford, Manchester; and published by the Proprietors, THE INTERNATIONAL SUGAR JOURNAL LTD., at Central Chambers, The Broadway, London, W.5. Entered at the New York Post Office as Second-Class Matter. Registered for transmission by Canadian Magazine Post.
PRINTED IN GREAT BRITAIN.